
HOUSING AND URBAN DEVELOPMENT

CLIMATE CHANGE ADAPTATION PLAN

JULY 2014



U.S. Department of
Housing and Urban Development

CONTENTS

Contents	2
Letter from the Secretary	3
Executive Summary.....	5
Introduction.....	5
Crosswalk of Vulnerabilities.....	6
How and Why This Plan was Developed.....	9
Actions to Address the Impact of Climate Change.....	12
1.0 Category: Update Program Policies and Regulations.....	12
2.0 Category: Develop Toolkits and Training Materials for HUD Grantees.....	24
3.0 Category: Prepare and Train HUD Staff.....	35
4.0 Category: Conduct Research on Climate-Related Risk.....	42
5.0 Category: Other Actions.....	45
Appendix A: Risk and Vulnerabilities Assessment.....	47
Extreme Weather Events.....	48
Temperature Shifts.....	61
Hydrological/ Precipitation Changes.....	65
Sea Level Rise.....	67
Appendix B: Resilience Council Members and Staff.....	70
Appendix C: List of Acronyms.....	72

LETTER FROM THE SECRETARY

Communities across America are already grappling with the debilitating effects of climate change. These effects are expected to increase and intensify in the years to come. Erosion and flooding threaten some communities while others struggle to fight wildfires made worse by drought. Some communities even face relocation due to permafrost melt and other factors. These and other climate-related hazards are directly impacting the Department of Housing and Urban Development (HUD)'s mission of creating strong, sustainable, inclusive communities, and quality affordable homes for all Americans.

The Department invests billions of dollars every year in housing, infrastructure, and services in communities across America. As the National Climate Assessment recently documented, climate-related risk is rapidly increasing. These risks are compounded as infrastructure ages and our population becomes more urbanized and moves closer to the coasts. Essential local and regional infrastructure systems (e.g., water, energy, and transportation) are interdependent and increasingly disrupted by the effects of climate change. Moreover, these impacts are exacerbated by existing social inequities and disproportionately affect already vulnerable populations—the very livelihoods of whom HUD is charged with improving. Climate change is not just an urban issue. Rural and Native American communities also face increased threats and rely on core HUD programs.

In addition to the unparalleled investment HUD makes every year on our nation's built environment, the Department is often the one of the largest sources of funding for long-term disaster recovery. For example, Congress has appropriated more than \$40 billion to HUD for disaster recovery funding since 2006 for Presidentially declared major disasters. These funds help communities reinvest in housing, economic development, and infrastructure, while ideally preventing damage from future disasters, consistent with the National Disaster Recovery Framework.

The Department is committed to identifying threats and adapting investments and policy practices to prepare communities to understand and respond to the effects of climate change, as well as recover rapidly and successfully from major events. As a result of this work, HUD and its partners will better protect lives and livelihoods, promote equitable and sustainable development, more successfully fulfill the Department's mission, and more responsibly steward limited fiscal resources. HUD will work to manage the effects of climate change on its mission, programs, and operations by:

- Engaging experts inside and outside of the Department to better understand the risks and respond to the impacts of climate change.

- Working with grantees to help reduce the vulnerability of local communities to climate change.
- Ensuring that the lives of vulnerable and disadvantaged populations are not only considered but improved as a result of these activities.
- Consulting with all levels of government (state, local, tribal, and territorial) to identify and remove barriers to resilient investments and respond to the needs of communities impacted by climate change.
- Understanding how environmental justice and other civil rights issues need to be considered in the development of responses to climate change.

Just recently, I established an internal HUD Resilience Council to align and institutionalize new approaches to key HUD programs and investments that enhance resilience to the effects of climate change and other natural disasters. The Resilience Council includes principals from each of HUD's core offices and is chaired by the Director of the Office of Economic Resilience and reports directly to me. The Council serves as the Department's forum for policy discussion and action to ensure all HUD programs and activities consider and incorporate resilience to climate-related and non-climate-related threats.

The potential effects of climate change on HUD, the nation, and the world are sobering. This Climate Change Adaptation Plan lays out an initial path for responding to the impacts of climate change on HUD's mission, programs, and operations. Through the Resilience Council, HUD will track the implementation of this Plan—but, we can't stop here. We need action from every HUD employee, grantee, and member of the public to look for innovative ways to better prepare and adapt to a changing climate. Together, we face an unprecedented challenge that brings with it opportunity to innovate and improve the lives and livelihoods of communities across the country.

Sincerely,

Shaun Donovan, Secretary

U.S. Department of Housing and Urban Development

EXECUTIVE SUMMARY

Introduction

The Third National Climate Assessment (released on May 6, 2014) contains an important message: climate change is not a distant threat or a scientific theory. It is already adversely affecting people in communities across the country. Climate-related hazards are myriad and range from extreme weather events to sea level rise. Each of the Department's many programs and communities served possess unique characteristics that contribute to the collective ability of the Department, its stakeholders, and its grantees to cope with the adverse effects of climate change. Taken together, the risk posed by climate change on HUD's programs and operations, the built environment HUD funds, and populations HUD serves is high. Real action is necessary to moderate the negative effects of climate change.

This Climate Change Adaptation Plan outlines out a set of actions designed to address some of the risk posed by climate change to the Department's mission, programs, and operations. In order to develop these actions, the Department participated in an adaptation planning exercise that began with an identification of climate-related risk and vulnerabilities. The results of this assessment are summarized in the Cross-Walk of Vulnerabilities below. For further detail see Appendix A: Risks and Vulnerabilities Assessment.

The threat posed by climate change to our country requires a comprehensive set of actions beyond what this plan lays out below. For instance, state and local governments may need to consider updating land use regulations, building codes, and other policies to protect the lives and livelihoods of their residents. The Department will continue to update this plan in accordance with Executive Order 13653, following the release of the next National Climate Assessment. In addition, the Department will continue to work with its stakeholders and to identify additional measures to address the impact of climate change.

Crosswalk of Vulnerabilities

Hydrological/Precipitation Changes

Primary Impacts	Programs	Structures	People	Administration
Amount, Intensity, and Seasonality of Precipitation	Indian Housing Block Grant, ICDBG, Native Hawaiian Housing Block Grant, Title VI, Section 184	Damage to public housing and HUD-assisted residential buildings	Respiratory illnesses associated with mold and mildew, especially among elderly, children, and persons with disabilities living in HUD-assisted housing or in communities assisted by HUD housing and community development funding	Readiness of staff to address hazards
Stream Flows and Lake Levels	Public housing, HCV	Access to potable water in public housing and HUD-assisted residential buildings		Changing grantee priorities due to Combined Sewer Overflows
Stormwater Runoff	CDBG, HOME, ESG, HOPWA, CoC	Damage to community infrastructure	Economic impact on agriculturally dependent communities	
	Lead Hazard Control Grant, Healthy Homes Production Grant			

Extreme Weather Events

Primary Impacts	Programs	Structures	People	Administration
Tropical Storms/Cyclones	Indian Housing Block Grant, ICDBG, Native Hawaiian Housing Block Grant, Title VI, Section 184	Damage to public housing and other residential buildings that receive HUD funding or mortgage insurance	Economic impact on communities	Disruption due to loss of power or damage to HUD offices and automated systems (including grantee and other payment systems)
Floods	Public housing, HCV		Changes to the availability of assisted and market rate housing in a community	Loss of program records
Droughts	CDBG, HOME, ESG, HOPWA, CoC	Damage or construction delays for HUD-funded infrastructure	Livelihoods, health, and safety, especially of low-income individuals, racial and ethnic minorities, persons with limited English proficiency, children, persons with disabilities, elderly persons, and functional needs populations living in HUD-assisted housing or in communities assisted by HUD community development funding	Increased community needs
Wildfires	HUD Disaster Programs			Changing grantee priorities due to response/recovery efforts
Landslides	Choice Neighborhoods Mortgage Insurance, Sections 242, 232, 202, and 811			
Tsunami ¹	FHIP, FHAP			
Winter Storms	Housing Counseling			
	Ginnie Mae Mortgage-Backed Securities (MBS)			Increased workload due to response/ recovery efforts
	Lead Hazard Control Grant, Healthy Homes Production Grant			Impediment to travel

¹ There is no known link between climate change and the occurrence of tsunamis. However, due to sea level rise, the damage caused by tsunamis may be greater in the future.

Temperature Shifts

Impacts	Programs	Structures	People	Administration
Heat Waves	Indian Housing Block Grant, ICDBG, Native Hawaiian Housing Block Grant, Title VI, Section 184	Damage to public housing and HUD-assisted residential buildings	Heat-related illness affecting children, elderly, persons with disabilities, and functional needs	Readiness of staff to address hazards
Water Temperature				Increased utility costs
Snowpack		Lack of Air Conditioning in public and Indian housing	populations living in HUD-assisted housing or in communities assisted by HUD community development funding	Disruption due to power outages and surges
Permafrost Melt				
	CDBG, HOME, ESG, HOPWA, CoC	Increased building energy costs, particularly in old or underperforming buildings	Risks to asthmatic individuals due to higher ground-level ozone concentrations	
	Lead Hazard Control Grant, Healthy Homes Production Grant			
			Uninhabitable Alaska Native communities built on thawing permafrost	

Sea Level Rise

Primary Impacts	Programs	Structures	People	Administration
Coastal Erosion	Indian Housing Block Grant, ICDBG, Native Hawaiian Housing Block Grant, Title VI, Section 184	Damage to and inundation of public housing and HUD-assisted buildings in flood zones, especially urban high-rises and in Puerto Rico and the Caribbean	Inundation and erosion of coastal communities	Increased community needs
Coastal Inundation			Economic impact on coastal communities	Damage to HUD offices
Storm and Tidal Surge			Relocation of communities, especially Alaska Native, Pacific and Caribbean Islands	Readiness of staff to address hazards and impediments to travel
	CDBG, HOME, ESG, HOPWA, CoC	Damage or construction delays for HUD-funded infrastructure	Psychological stress	Disruption due to loss of power
	Mortgage Insurance, Sections 242, 232, 202, and 811			Changing grantee priorities
	Lead Hazard Control Grant, Healthy Homes Production Grant			
	FHIP, FHAP			

HOW AND WHY THIS PLAN WAS DEVELOPED

HUD developed this plan in response to Executive Orders 13514 and 13653. Under these Executive Orders, each Executive department and agency is required to evaluate risks related to climate change that threaten their mission, programs, or operations. In addition, lessons learned from Hurricane Sandy and other recent disasters, as well as the Department's work to execute the President's Climate Action Plan greatly influenced this plan.

On October 5, 2009, the President issued Executive Order 13514 (EO 13514), which required Federal agencies to evaluate climate change risks and vulnerabilities to each agency's operations and mission. The White House Council on Environmental Quality (CEQ) subsequently issued three guidance documents, pursuant to EO 13514, regarding considerations critical to Federal agency climate change adaptation planning. Together, EO 13514 and guidance documents called on every Executive Agency to identify risks and vulnerabilities to the agency's mission, programs, and operations posed by climate change, and develop, prioritize, and implement actions that address these risks and vulnerabilities. In response, HUD issued its first Agency Climate Change Adaptation Plan in 2012. The Under 5 Initiative² at HUD spearheaded development of the 2012 plan with input from each office.

The President issued Presidential Policy Directive 8 ("National Preparedness") on March 30, 2011, which called for the development of a National Preparedness Goal and subsequent National Preparedness System to strengthen the security and resilience³ of the United States to a wide variety of major threats. As a result, there are five National Planning Frameworks (Prevention, Protection, Mitigation, Response, and Disaster Recovery) that describe how an entire community works together to achieve the National Preparedness Goal. HUD is actively involved in federal leadership groups to execute core capabilities identified in several of these frameworks. For instance, HUD leads the Housing Recovery Support Function within the National Disaster Recovery Framework. The focus of these efforts includes increasing the nation's resilience to catastrophic natural disasters, among other threats.

On November 6, 2013, the President issued Executive Order 13653⁴ (EO 13653) to prepare the United States for the impact of climate change and enhance our climate preparedness and resilience. This Executive Order called on Executive Agencies to further develop, update, and

² Under 5 is a grassroots group of employees at HUD focused on retaining new hires and talent at the agency by engaging them to develop proactive solutions to improving agency operations through constructive engagement.

³ PPD-8 defines resilience as "the ability to adapt to changing conditions and withstand and rapidly recover from disruption due to emergencies."

⁴ EO 13653 defines resilience as "the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions."

implement their Agency Climate Change Adaptation Plans. In addition, EO 13653 created the Council on Climate Change Preparedness and Resilience and disbanded the Interagency Climate Change Adaptation Task Force. This new council, and the task force before it, supports the development of Agency Climate Change Adaptation Plans as well as Federal efforts to prepare for the impact of climate change broadly. Subsequently, the Council on Environmental Quality issued guidance on December 19, 2013 to direct the development of Agency Climate Change Adaptation Plans in accordance with EO 13653.

The Hurricane Sandy Rebuilding Task Force, established by President Obama, chaired by Secretary Donovan, and made up of principals from more than 15 Federal departments, agencies, and White House offices, released its Rebuilding Strategy on August 19, 2013. This strategy included 69 policy recommendations, including ones focused on improving the nation's ability to withstand and recover effectively from future climate-related disasters. President Obama's Climate Action Plan incorporated several policies and principles developed by the Hurricane Sandy Rebuilding Task Force. The Climate Action Plan laid out a series of responsible, common sense steps to prepare communities for the impacts of a changing climate. These steps included the need for the Federal government to make investments based on the most up-to-date information about future risks.

This plan also aligns with HUD's commitments under Executive Order 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations" (February 11, 1994), which directs each Federal agency, to the greatest extent practicable and permitted by law, to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

Recognizing the need to institutionalize lessons learned and align new approaches to enhance resilience, HUD Secretary Shaun Donovan created the HUD Resilience Council and tasked it with creating this plan. The Resilience Council includes principals from each of HUD's core offices and is staffed by designees from each office. To develop this plan, staff met weekly and engaged their offices in a coordinated exercise to identify risks and vulnerabilities to their mission, programs, and operations. Then, each office developed a set of proposed actions to address those risks and vulnerabilities. Each of the actions were vetted by the Resilience Council principals and incorporated into this plan.

Going forward, the Resilience Council will continue to track the implementation of this plan, as well as focus on the following three core activities.

1. Create a structure and process to educate and inform HUD program managers on the evolving risks and vulnerabilities created by a changing climate and make key decisions regarding resilience.
2. Engage partners to access the latest climate risk information and build on their work to respond to and anticipate climate impacts and build community resilience.
3. Facilitate the completion of key deliverables for HUD's resilience work.

ACTIONS TO ADDRESS THE IMPACT OF CLIMATE CHANGE

1.0 Category: Update Program Policies and Regulations

1.1 Update Disaster Assistance and Targeted Lending Initiative Policies

Status:	Proposed
Lead Office(s):	Ginnie Mae
Support Office(s):	FHA
Hazard(s):	Sea level rise and extreme weather events
Vulnerabilities:	Sea level rise and extreme weather events could affect the condition of single- and multi-family properties, which are collateral for Ginnie Mae mortgage-backed securities. Catastrophic losses, affecting a significant number of borrowers and issuers by damaging collateral and/or impacting borrowers' ability to pay, could put Ginnie Mae reserves and operations in jeopardy.
Geographic scale:	Nationwide
Action description:	This option will identify and determine the feasibility of updating two major Ginnie Mae policies. First, the disaster assistance policies, which provide temporary relief to mortgage issuers, could be updated. Second, the Targeted Lending Initiative could be expanded to encourage investment in properties with enhanced disaster resilience and sustainability ⁵ features.
Major Milestones:	<ol style="list-style-type: none">1) Develop options/feasibility memorandum.2) Obtain legal authority, as needed.3) Outline feasibility considerations in creating new, custom pool type(s) for specific loan or property types.4) Develop, test, and implement legal, market, and technological system changes.5) Update Chapters 33, 34, and any other applicable chapters of the Ginnie Mae Mortgage-Backed Securities Guide, the Guaranty

⁵ Executive Order 13514 defines "sustainability" and "sustainable" as creating and maintaining conditions, under which humans and nature can exist in productive harmony, permitting the fulfillment of the social, economic, and other requirements of present and future generations.

Agreement, or investor disclosure documents such as prospectuses, and data disclosures.

6) Issue All Participant Memorandum to announce new program features.

Resources Needed: May require statutory or Mortgage-Backed Securities Guide level regulatory changes and additional resources (staff, program funds) to accomplish.

1.2 Evaluate Feasibility of Securitizing Title I Property Improvement Loans in Ginnie Mae Mortgage-Backed Securities

Status: Proposed

Lead Office(s): Ginnie Mae

Support Office(s): OGC

Hazard(s): Sea level rise and extreme weather events

Vulnerabilities: Sea level rise and extreme weather events could affect the condition of single- and multi-family properties, which are collateral for Ginnie Mae mortgage-backed securities. Catastrophic losses, affecting a significant number of borrowers and issuers by damaging collateral and/or impacting borrowers' ability to pay, could put Ginnie Mae reserves and operations in jeopardy.

Geographic scale: Nationwide

Action description: Currently, Title I property improvement loans can be securitized in Ginnie Mae pools under existing statutory authority; however, the current Mortgage-Backed Securities Guide does not allow securitization of these loans, and there are substantial difficulties in pooling these small second lien loans in Ginnie Mae mortgage-backed securities. Ginnie Mae's existing pool types are based on and backed by first lien loans. In addition, there are significant economic obstacles to efficient securitization of small property improvement loans—primarily the relative cost of servicing and bond administration—and there is currently little investor and lender demand for this product. New security types would also need to be created because these loans cannot be commingled with currently eligible loans in existing security types. The overall cost of such engineering efforts in dollars, staff time, and contractor resources would be substantial. Allowing these loans to

be securitized could provide additional capital and facilitate financing for property improvements, light or moderate rehabilitation, and repairs to enhance disaster resilience and hazard mitigation. This measure could also limit risk before disasters strike, particularly to improve the safety, quality, and sustainability of properties located in areas that are most vulnerable to these climate-related hazards. Securitizing these loans would require significant changes to the Mortgage-Backed Securities Guide legal authority, program guidelines, existing contracts, disclosures, and pooling infrastructure.

- Major Milestones:
- 1) Develop options/feasibility memorandum.
 - 2) Gather feedback from Congress, mortgage issuers, and investors.
 - 3) Obtain Mortgage-Backed Securities Guide-level legal authority.
 - 4) Create new mortgage-backed securities program and specified pool type(s).
 - 5) Develop, test, and implement technological system changes.
 - 6) Update Ginnie Mae Mortgage-Backed Securities Guide, the Guaranty Agreement, investor disclosure documents, and data disclosures, and review the need to alter or amend contracts with outside vendors.
 - 7) Issue All Participant Memorandum to announce the program.
- Resources Needed: May require Mortgage-Backed Securities Guide level regulatory changes and additional resources (staff, program funds) to accomplish.

1.3 Conduct Outreach with Mortgage Insurance and Guaranty Agencies to Facilitate Coordination of Consistent Disaster Assistance Policies

- Status: Proposed
- Lead Office(s): Ginnie Mae
- Support Office(s): FHA, PIH
- Hazard(s): Sea level rise and extreme weather events
- Vulnerabilities: Sea level rise and extreme weather events could affect the condition of single- and multi-family properties, which are collateral for Ginnie Mae mortgage-backed securities. Catastrophic losses affecting a significant number of borrowers and issuers by

damaging collateral and/or impacting borrowers' ability to pay could put Ginnie Mae reserves and operations in jeopardy.

Geographic Scale: Nationwide

Action Description: As Ginnie Mae is in a position to be a conduit and bring continuity to the federal mortgage market, Ginnie Mae can conduct outreach with the federal mortgage insurance and guaranty agencies (i.e., FHA, VA, USDA-Rural Development, and PIH) to help coordinate consistent disaster assistance/resilience policies and program requirements for federally insured or guaranteed mortgages that are pooled in Ginnie Mae securities. These interagency efforts would facilitate continuity of mortgage guidelines (e.g., aligned forbearance policies and standards after a disaster) between the agencies for applicable loans in Ginnie Mae securities, which would promote equal treatment for borrowers who are impacted by climate-related disasters.

Major Milestones: 1) Conduct outreach and schedule interagency meetings with mortgage insurance and guaranty agencies.
2) Review current disaster assistance/resilience policies and program requirements.
3) Assist with coordination of consistent, updated policies and program requirements, and alignment where necessary and feasible.

Resources Needed: May require statutory or regulatory changes and additional resources (staff, program funds) to accomplish.

1.4 Update Part 55 Floodplain Regulation to Require Higher Flood Elevation

Status: Underway

Lead Office(s): CPD

Support Office(s): PIH, FHA, OGC

Hazard(s): Sea level rise, extreme weather events, hydrological and precipitation changes

Vulnerabilities: Communities across the country rely on HUD funding to build hospitals, housing, infrastructure, and other vital community resources. These investments should last decades; however, many are increasingly at risk from flooding.

Geographic scale:	Nationwide
Action description:	This rule would revise HUD's floodplain management regulations to require that projects involving new construction or substantial improvement be elevated additional footage above the base flood elevation, as determined by FEMA's best available data. Requiring a higher standard will (1) reduce the risk of flood loss and insurance premiums; (2) minimize the impact of floods on human safety, health, and welfare; and (3) promote sound, sustainable, long-term planning informed by a more accurate evaluation that takes into account possible sea level rise.
Major Milestones:	1) Gain departmental clearance. 2) Publish Proposed Rule. 3) Publish Final Rule. 4) Publish additional program guidance, as necessary.
Resources Needed:	None

1.5 Update Environmental Assessment Factors for 24 CFR Part 50 and Part 58 Reviews

Status:	Proposed
Lead Office(s):	CPD
Support Office(s):	PIH, OLHCHH, FHA, OGC, FHEO
Hazard(s):	All
Vulnerabilities:	Communities across the country rely on HUD funding to build hospitals, housing, infrastructure, and other vital community resources. Current environmental risks are assessed; however, many of these investments are intended to last several decades, representing significantly different risk profiles.
Geographic scale:	Nationwide
Action description:	The CEQ draft National Environmental Policy Act Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions from February 2010 asks agencies to determine which climate change impacts warrant consideration in their Environmental Assessments and Environmental Impact Statements. Per the CEQ guidance, HUD's efforts will consider the particular impacts of climate change on vulnerable communities where this

may affect the design of the action or the selection among alternatives. The HUD Office of Environment and Energy can undertake this action to provide guidance on how HUD can address climate change in environmental reviews under Part 50 and Part 58 for all HUD programs, including the Multifamily Accelerated Processing Guide.

Major Milestones: 1) Compile best practices from other agencies.
2) Update Environmental Assessment Factors for Parts 50 and 58.
3) Gain departmental clearance.
4) Published Proposed Rule.
5) Publish Final Rule.
6) Publish additional program guidance, as necessary.

Resources Needed: May require shifting priorities and/or additional resources (staff) to accomplish.

1.6 Review Existing Programs for Barriers to Investments in Resilience and Sustainability

Status: Proposed

Lead Office(s): Resilience Council

Support Office(s): CPD, PIH, FHA, FHEO, OLHCHH

Hazard(s): All

Vulnerabilities: Communities across the country rely on HUD funding to build and maintain hospitals, housing, infrastructure, and other vital community resources. These assets are vulnerable to both gradual-shift and acute climate-related hazards, ranging from pest migration to tropical storms.

Geographic scale: Nationwide

Action description: Conduct a top-to-bottom analysis of existing policy, programmatic, and other barriers to sustainability and resilience in HUD programs. The study will review and consider statutory and regulatory requirements as well as program funding levels. Analysis will include forthcoming recommendations from the President's State, Local, and Tribal Leaders Task Force on Climate Change Preparedness and Resilience. Staff will categorize findings to

determine which barriers can be immediately removed or resolved, and which require additional authority to remove.

Major Milestones: 1) Identify relevant programs.
2) Survey HUD staff.
3) Hold regional feedback meetings with stakeholders.
4) Compile recommendations.
5) Publish report.

Resources Needed: May require additional resources (staff) to accomplish.

1.7 Update Building Standards to Incorporate Sustainability and Resilience Measures

Status: Proposed

Lead Office(s): PD&R

Support Office(s): OGC, PIH, FHEO

Hazard(s): All

Vulnerabilities: Communities across the country rely on HUD funding to build and maintain hospitals, housing, infrastructure, and other vital community resources. These assets are vulnerable to both gradual-shift and acute climate-related hazards, ranging from pest migration to tropical storms.

Geographic scale: Nationwide

Action description: Review and establish building standards for new construction and substantial rehabilitation to incorporate sustainability and resilience measures. The standards will be reviewed to ensure they are consistent with requirements of accessibility to persons with disabilities. Ensure that Puerto Rico and other areas with unique building considerations are not left out. Establish a timeline for regular review and updating. Ensure that, wherever appropriate, all HUD programs have minimum standards where building codes do not apply. Connect with existing efforts to update energy code requirements.

Major Milestones: 1) Inventory existing building standards within HUD programs.
2) Develop set of resilient building standards, based on regional projections.

- 3) Identify shortcomings from standards and program requirements.
- 4) Propose changes to program requirements and standards.

Resources Needed: May require shifting priorities and/or additional resources (contract funds, staff) to accomplish.

1.8 Review and Improve PHA Insurance Policy Rules

Status: Proposed

Lead Office(s): PIH

Support Office(s): None

Hazard(s): Extreme weather events, sea level rise, hydrological and precipitation changes

Vulnerabilities: Many climate-related hazards could cause damage to public housing facilities.

Geographic scale: Nationwide

Action description: Evaluate and improve PIH policy on insurance requirements for PHAs to anticipate a variety of climate change impacts. Train staff to evaluate the best way to ensure PHAs have adequate insurance coverage.

Major Milestones:

- 1) Review and document policy on insurance.
- 2) Draft guidance.
- 3) Obtain departmental clearance.
- 4) Publish guidance.

Resources Needed: May require additional resources (staff) to accomplish.

1.9 Update Policies on Subsidizing Air Conditioning in Public Housing

Status: Proposed

Lead Office(s): PIH

Support Office(s): CIR

Hazard(s): Temperature shifts

Vulnerabilities:	Many public housing developments do not have air conditioning or other measures to counteract extreme heat. PIH statutory requirements do not allow HUD funds to be used for air conditioning in low-income public housing (LIPH) developments except in extenuating circumstances. The effects of extreme heat are worsened due to poor performing buildings, urban heat island effects, and vulnerable populations (46% of LIPH household heads are older than 62 years old and 20% of LIPH residents are persons with disabilities).
Geographic scale:	Nationwide
Action description:	Evaluate the funding, health, and safety impacts of subsidizing air-conditioning in public housing where appropriate, as well as the current distribution of this technology in the building stock. Carefully tie to energy efficiency and renewable energy efforts in order to counteract budgetary implications and provide a logistical path for installation of this technology. Coordinate with noise attenuation requirements for mechanical ventilation.
Major Milestones:	<ol style="list-style-type: none">1) Evaluate the burden to the operating fund due to increased recurring utility costs for air conditioning in LIPH, as well as possible energy efficiency and renewable energy measures to offset cost increases.2) Amend guidance where permitted by statute.3) Propose new statutory language allowing air conditioning expenses in LIPH and energy efficiency and renewable energy measures to offset increased costs.
Resources Needed:	Requires statutory change and may require additional resources (staff) to accomplish.

1.10 Update Utility Expense Level, Utility Allowance, and Utility Surcharge Formulas

Status:	Proposed
Lead Office(s):	PIH
Support Office(s):	Utility Allowance Alignment Working Group
Hazard(s):	Temperature shifts

Vulnerabilities:	Temperature shifts and more frequent extremes may increase heating and cooling costs in buildings that receive HUD subsidy, particularly poor performing buildings. Cost increases exacerbate financial burdens for low-income tenants and threaten the fiscal stability of subsidized housing assets, potentially leading to the loss of assisted stock.
Geographic scale:	Nationwide
Action description:	Revisit the current Utility Allowance and Utility Surcharge formulas and regulations in light of increase stress on building performance due to permanent temperature change and extreme weather swings. Do so in partnership with the Utility Allowance Alignment Group's efforts.
Major Milestones:	<ol style="list-style-type: none"> 1) Review existing utility funding formulas. 2) Analyze risk to funding should temperature shifts significantly impact costs as calculated through current formulas. 3) Amend and distribute revised guidance as necessary and permitted by statute. 4) Propose statutory changes, as necessary.
Resources Needed:	May require statutory change and additional resources (staff, program funds) to accomplish.

1.11 Update Section 203(k) Policies and Promote Program Use for Hazard Mitigation

Status:	Underway
Lead Office(s):	FHA
Support Office(s):	OGC
Hazard(s):	Extreme weather events
Vulnerabilities:	There is a wide variety of hazard mitigation measures available to homeowners and homebuyers to prepare for extreme weather events. However, funding is not often available for resilient retrofits.
Geographic scale:	Nationwide
Action description:	Section 203(k) insurance enables homebuyers and homeowners to finance the purchase of (or refinance) a single-family home and

the cost of its rehabilitation through a single mortgage, or finance the rehabilitation of their existing home. Reviewing the 203(k) program to revise and improve the program will continue to encourage the use of the program to repair/rehabilitate damaged properties as well as for hazard mitigation.

Major Milestones: 1) Review existing program.
2) Propose changes (some of which maybe regulatory).
3) Publish Proposed and Final Rules.
4) Publish Mortgagee Letter.

Resources Needed: May require statutory change to accomplish.

1.12 Encourage Consolidated Plans to Incorporate Planning for Climate-Related Risk

Status: Proposed

Lead Office(s): CPD

Support Office(s): None

Hazard(s): All

Vulnerabilities: Communities across the country are at risk from more frequent and severe disasters as well as more gradual changes such as sea level rise and temperature change. Further, disproportionate risks may exist where housing serving low-income minorities, families with children, and persons with disabilities has been concentrated in areas more likely to be impacted by the effects of climate change, and where adequate infrastructure has not been provided to such areas to assist residents in coping with health and safety hazards, property damage, and disruptions to work and school life. A variety of socioeconomic and demographic factors increase the vulnerability of urban populations. Activities and programs included in grantees' Consolidated Plans vary from investments in infrastructure to the provision of social services.

Geographic scale: Nationwide

Action description: Encourage CPD grantees to discuss climate-related risk and actions needed to minimize potential impact of these risks on vulnerable populations served by CPD programs (including, but not limited to, assessing and mitigating any disproportionate risks that may exist for sub-populations), in their Consolidated Plans. As

part of action 2.1, provide instructions for grantees that wish to reflect approved Hazard Mitigation Plans in their Consolidated Plans using the template in CPD's Integrated Disbursement and Information System (IDIS).

Major Milestones: 1) Develop draft additions to instructions for completing the Consolidated Plan template and related materials.
 2) Consult other HUD program offices for comments on draft.
 3) Issue instructions in conjunction with technical assistance.

Resources Needed: May require additional resources (staff) to accomplish.

2.0 Category: Develop Toolkits and Training Materials for HUD Grantees

2.1 Action: Develop Toolkits and Training Materials for HUD Grantees

Status:	Proposed
Lead Office(s):	CPD
Support Office(s):	None
Hazard(s):	Extreme weather events, hydrological and precipitation changes
Vulnerabilities:	Extreme weather events and increased frequency and duration of precipitation can have devastating impacts on states and municipalities that receive HUD funding to meet local housing and community development needs. Extreme weather events could cause project delays, plan changes, economic risks, and stretch grantee capacity.
Geographic scale:	Nationwide
Action description:	Develop guidance and tools to help grantees incorporate climate risk mitigation (including, but not limited to, assessing and mitigating any disproportionate risks that may exist for sub-populations) into their affordable housing and community development programs, consistent with the National Disaster Recovery Framework, including, but not limited to: instructions for grantees that wish to reflect approved Hazard Mitigation Plans in their Consolidated Plans using the template in CPD's Integrated Disbursement and Information System (IDIS); describing eligible uses of CPD grant funds that align with potential Hazard Mitigation activities; and coordinate with work being done with the Department of Homeland Security's ResilienceStar policy group to provide guidance for new construction and rehabilitation of green building and fortified building standards.
Major Milestones:	<ol style="list-style-type: none"> 1) Define scope and submit Technical Assistance (TA) request to OneCPD. 2) Meet with other HUD program offices and TA providers at initiation of TA engagement to further define scope of toolkits and guidance. 3) Select Technical Assistance provider and develop scope of work. 4) Review Technical Assistance provider deliverables. 5) Share information with grantees via OneCPD.

Resources Needed: May need additional (staff) to accomplish.

2.2 Expand CPD Maps to Include Data on Future Climate-Related Hazards

Status: Proposed

Lead Office(s): CPD

Support Office(s): PD&R

Hazard(s): Sea level rise, extreme weather events, hydrological and precipitation changes

Vulnerabilities: Extreme weather events and increased frequency and duration of precipitation can have devastating impacts on states and local governments that receive HUD funding to meet local housing and community development needs.

Geographic scale: Nationwide

Action description: Incorporate data on climate change hazard and vulnerability factors into CPD Maps so they can be displayed in context of other demographic data, such as population income and age, and housing stock conditions currently available in CPD Maps. These data help inform CPD grantees to assess community needs when they are making decisions about how to target CPD resources.

Major Milestones: 1) Identify key data resources and review for feasibility to display in CPD Maps.
2) Request work plan from the Enterprise GIS Geospatial Coordinating Committee to add data and possible new functionality/tool to CPD Maps.
3) Implement new data CPD Maps and Integrated Disbursement and Information System (IDIS) and announce to grantees (coordinate with toolkit development).

Resources Needed: May require additional resources (program funding) to accomplish.

2.3 Launch the HUD Environmental Review Online System (HEROS)

Status: Underway

Lead Office(s): CPD

Support Office(s):	None
Hazard(s):	All
Vulnerabilities:	Communities across the country rely on HUD funding to build and maintain housing, infrastructure, hospitals, and other vital community resources. These assets are vulnerable to both gradual-shift and acute climate-related hazards, ranging from pest migration to tropical storms.
Geographic scale:	Nationwide
Action description:	HEROS is currently being introduced to entitlement grantees, and in the future will be used by all HUD programs subject to environmental review requirements. HEROS will inform HUD of environmental trends. Data from HEROS can be used to develop policy and guidance for all HUD programs to better address impacts from climate change. For example, the Water Resources Report will look at data on how many projects are located in a floodplain or wetland, and types of mitigation measures that are being taken for these projects. Additionally, data from HEROS can be used in conjunction with data from other HUD systems to analyze climate related impacts on certain populations.
Major Milestones:	1) Require HEROS for all HUD programs, subject to environmental review requirements. 2) Develop a schedule for analyzing data in HEROS, and identify future enhancements and/or data points that might be relevant for climate adaptation. Analyze data and identify areas for policy and guidance development.
Resources Needed:	None

2.4 Ensure Public Housing Resident Inclusion in a Quality and Resilient Emergency Notification System

Status:	Proposed
Lead Office(s):	PIH, PD&R
Support Office(s):	None
Hazard(s):	Extreme weather events (all)

Vulnerabilities:	Children are particularly vulnerable to lack of access to public transportation, separation from family and guardians, and disruption of childcare during evacuations and recovery periods, as well as the lack of heat, water, food, and air conditioning brought about by power outages. In addition, persons with disabilities, elderly persons, and populations with access and functional needs can be disconnected from medical professionals, care arrangements, and other vital support services during a disaster.
Geographic scale:	Nationwide
Action description:	Use and enhance existing data systems to maintain or participate in a robust resident information system at each PHA for use in cases of emergency. Where possible, leverage existing data systems and touch points with residents to ensure resident inclusion in a quality and resilient emergency notification system.
Major Milestones:	TBD
Resources Needed:	May require additional resources (staff, program funding) to accomplish.

2.5 *Develop Guidance on Building Design, Construction, and Retrofit for Sustainability and Resilience*

Status:	Proposed
Lead Office(s):	PD&R
Support Office(s):	PIHD, CPD, FHA, FHEO, OLHCHH
Hazard(s):	All
Vulnerabilities:	HUD-assisted residential buildings may not be resilient to projected climate change hazards, such as extreme weather events and damage associated with temperature shifts and sea level rise.
Geographic scale:	Nationwide
Action description:	Develop/adapt easy-to-use guidance on building design, construction, and retrofit for sustainability and resilience. Develop modules for specific building owner types (e.g., assisted, PHAs,

tribes). Update the OneCPD green rehabilitation guidance developed for the NSP program to incorporate additional resilience-related elements. Ensure that traditionally underserved areas (e.g., Puerto Rico) are not left out. Include guidance on accessibility for persons with disabilities. Incorporate with efforts through the Recovery Support Function Federal Leadership Group.

Major Milestones: 1) Review existing resources and literature.
2) Draft technical assistance materials.
3) Issue materials.

Resources Needed: May require additional resources (staff) to accomplish.

2.6 *Develop Guidance on Mold and Mildew Prevention*

Status: Underway

Lead Office(s): OLHCHH

Support Office(s): PIH, CPD, FHA, PD&R

Hazard(s): Hydrological/precipitation changes, extreme weather events

Vulnerabilities: Flooding and moist conditions can create or increase mold and mildew in HUD-assisted residential buildings. This can have a variety of health-related impacts, particularly on children, elderly, and persons with disabilities.

Geographic scale: Nationwide

Action description: Update and distribute existing mold and mildew guidance to ensure that all specific building owner types (e.g., assisted, PHAs, tribes) are aware of the issue and protocols.

Major Milestones: 1) Review existing resources and literature.
2) Draft guidance.
3) Issue guidance.

Resources Needed: May require additional resources (program funding, staff) to accomplish.

2.7 *Develop Guidance on Integrated Pest Management*

Status: Proposed

Lead Office(s):	OLHCHH
Support Office(s):	PIH, CPD, FHA
Hazard(s):	Hydrological/precipitation changes, temperature shifts
Vulnerabilities:	Increases in temperature and moist environments may increase the frequency and magnitude of pest infestations in buildings.
Geographic scale:	Nationwide
Action description:	Update and market existing integrated pest management guidance to ensure that all specific building owner types (e.g., assisted, PHAs, tribes) are aware of the issue and protocols.
Major Milestones:	TBD
Resources Needed:	May require additional resources (program funding, staff) to accomplish.

2.8 *Review and Update Civil Rights Training for Grantees That Receive Supplemental Disaster Recovery Assistance from HUD*

Status:	Proposed
Lead Office(s):	FHEO, CPD
Support Office(s):	OGC
Hazard(s):	Extreme weather events
Vulnerabilities:	Following a disaster, priority is often given to expediency leading to unintended civil rights and fair housing violations.
Geographic scale:	Nationwide
Action description:	Review training materials on fair housing and civil rights requirements provided to grantees receiving HUD supplemental Disaster Recovery assistance and update as needed to ensure Disaster Recovery grantees implement their programs according to these requirements. Fair housing and civil rights requirements, include, but are not limited to, accessibility of communications and

advertising of disaster recovery assistance to persons with limited English proficiency and persons with disabilities.

Major Milestones: 1) CPD and FHEO review existing training materials and identify any needed updates to ensure civil rights and fair housing program requirements are sufficiently addressed.
2) Update training materials, as needed.
3) If updated training materials are developed, implement updated training for all communities receiving disaster recovery assistance going forward.

Resources Needed: May require additional resources (staff) to accomplish.

2.9 Provide Training for Fair Housing Initiatives Program and Fair Housing Assistance Program Grantees

Status: Proposed

Lead Office(s): FHEO

Support Office(s): None

Hazard(s): Extreme weather events

Vulnerabilities: In the immediate aftermath of a disaster, priority is often given to expediency causing unintended civil rights, environmental justice, and fair housing violations. In addition, populations traditionally served by fair housing organizations are often disproportionately impacted by extreme weather events and may require additional services in order to secure or maintain adequate housing.

Geographic scale: Nationwide

Action description: Provide training for Fair Housing Initiatives Program (FHIP) and Fair Housing Assistance Program (FHAP) on discrimination arising out of climate-related disasters and how to respond to local policies and community pressures that would impose barriers for members of protected classes to return to their communities. Also provide training on how to address civil rights issues involving environmental hazards.

Major Milestones: 1) Develop training for FHIP and FHAP grantees.
2) Conduct training for FHIP and FHAP grantees.

Resources Needed: May require additional resources (staff) to accomplish.

2.10 Use Disaster Area Response Teams in Indian Country to Prepare For and Respond to Disasters

Status: Ongoing

Lead Office(s): PIH

Support Office(s): None

Hazard(s): Extreme weather events

Vulnerabilities: Damage to or destruction of HUD-assisted housing for low-income American Indian and Alaska Natives, leading to declining community health and wellbeing, neighborhood disinvestment, and increased demand for housing funds and social services.

Geographic scale: Indian and Alaska Native country, as well as the Hawaiian home lands

Action description: Use teams in each of HUD's six Area Offices of Native American Programs to work with American Indian and Alaska Native tribal governments, as well as the Department of Hawaiian Home Lands to ensure a coordinated Federal response to potential hazards and disasters. This includes assisting tribes to apply for Imminent Threat grants under ICDBG.

Major Milestones:

- 1) Establish regional staff points of contact for Disaster Area Response Teams.
- 2) Collect and maintain contact information for tribal leaders, first responders, and other Federal agencies.
- 3) Draft resource manuals for disaster preparedness and response.
- 4) Establish monthly reporting for Area Offices on disaster preparedness/response activities.
- 5) Finalize region-specific resource manuals for disaster-related resources.
- 6) Lead workshops with tribal leaders on disaster preparedness/response.

Resources Needed: None

2.11 Develop Guidance on Physical Hazards from Disaster Response/Recovery Activities

Status:	Proposed
Lead Office(s):	OLHCHH
Support Office(s):	PD&R, CPD, FHA, PIH
Hazard(s):	Extreme weather events
Vulnerabilities:	Many hazardous materials are moved or exposed during a disaster. Due to the nature of disaster response and recovery, non-professionals are exposed to hazardous materials that they do not normally work with.
Geographic scale:	Nationwide
Action description:	Develop and promote informational materials, technical bulletins, training modules and guidance, particularly for non-professionals, to reduce the susceptibility of residents, volunteers, and others to physical hazards during disaster recovery. The guidance and training would be organized specifically around those materials and physical conditions that: 1) have the potential to impact the health of residents/volunteers/workers; and 2) are likely to be found following an extreme weather event, particularly involving post-flooding recovery. Coordinate with other Federal departments and agencies, as needed.
Major Milestones:	1) Establish working group. 2) Identify information gaps and needed products. 3) Develop existing resources review. 4) Draft guidance. 5) Issue guidance.
Resources Needed:	None

2.12 Provide Training for Office of Lead Hazard Control and Healthy Homes Grantees on Adapting to Extreme Weather Events

Status:	Proposed
Lead Office(s):	OLHCHH
Support Office(s):	None

Hazard(s):	Extreme weather events
Vulnerabilities:	Increasing frequency of extreme weather events will require OLHCHH grantees to enhance their ability to operate in storm damaged areas and potentially respond to storms with redirection of resources. This issue impacts OLHCHH programs. Populations impacted include staff at the OLHCHH local grantee programs.
Geographic scale:	Nationwide
Action description:	Develop and promote informational materials, technical bulletins, training modules and guidance, particularly for non-professionals, to reduce the susceptibility of residents, volunteers, and others to physical hazards during disaster recovery. The guidance and training would be organized specifically around those materials and physical conditions that 1) have the potential to impact the health of residents/volunteers/workers and 2), are likely to be found following an extreme weather event, particularly involving post flooding recovery. Coordinate with other Federal departments and agencies, as needed.
Major Milestones:	<ol style="list-style-type: none"> 1) Create program manual guidance for continuation of operations in a disaster recovery zone. 2) Create guidance on how to work with and support disaster recovery efforts with existing resources. 3) Deliver training at on both elements at annual OLHCHH Program Manager's School and as needed after extreme weather events. 4) Identify resources from OLHCHH for inclusion in regional disaster response planning. 5) Develop assessment of how this training (and training materials) could be adapted for use by other HUD programs.
Resources Needed:	None

2.13 Brief State and Local Governments on HUD Recovery Activities Pre-Disaster

Status:	Underway
Lead Office(s):	FPM, ODMNS
Support Office(s):	CPD, PIH, FHA, FHEO, OLHCHH

Hazard(s):	Extreme weather events
Vulnerabilities:	Extreme weather events often affect multiple jurisdictions and levels of government. Lack of clarity regarding Federal roles and available or potential resources can undermine effective planning and slow the identification of real solutions across these layers. Pre-disaster partnership development, transparent discussions of available or potential Federal resources, and information sharing are critical.
Geographic scale:	Nationwide
Action description:	Pre-disaster, HUD field office directors will brief state and local government partners on response and recovery activities HUD's existing programs can support, what gaps will remain absent additional funding, as well as strategies to fill those gaps. As part of this, field office directors will also convene, coordinate and connect National Disaster Recovery Framework's Housing Recovery Support Function primary and support agencies to this process. State and local government partners will include Fair Housing Assistance Program agencies to promote coordination on fair housing issues, as well as environmental review requirements and considerations.
Major Milestones:	<ol style="list-style-type: none">1) Establish points of contact lists for each field office jurisdiction that include key state, local, and federal partners under the National Disaster Recovery Framework.2) Establish a working relationship with the state Disaster Housing Task Force in each state (if in operation) and meet with this body each fiscal year and as needed or requested.3) Convene primary and support agencies under the Housing RSF of the National Disaster Recovery Framework each fiscal year and as needed or requested, including available and potential resources for post-disaster recovery, information sharing, and federal support for state recovery efforts.
Resources Needed:	May require additional resources (staff) to accomplish.

3.0 Category: Prepare and Train HUD Staff

3.1 *Improve Operational Readiness of HUD Field Staff*

Status:	Ongoing
Lead Office(s):	FPM, FHEO, OHHLHC, ODMNS
Support Office(s):	PIH, CPD
Hazard(s):	Extreme weather events (all)
Vulnerabilities:	Disaster response and recovery are collateral duties for most staff. Failure to exercise and clarify these duties can atrophy capacity. This can delay return to operations and HUD assistance to grantees or impacted areas under interagency partnerships after extreme weather events.
Geographic scale:	Nationwide
Action description:	Increase the number of approved telework agreements in place and develop alternative communications structures in order to ensure operational viability of HUD field offices in the event of disaster.
Major Milestones:	<ol style="list-style-type: none"> 1) Establish phone chains at the field office level (complete). 2) Launch campaign to promote telework. 3) Require FPM staff to learn how local and state emergency management systems work and the role of local HUD offices. 4) Establish clear guidance and train FPM and program office leadership in the field on disaster reporting, COOP, and HUD disaster response and recovery roles and responsibilities. 5) Establish, train, and maintain disaster volunteer cadres for mission assignments with FEMA under the National Response Framework and the National Disaster Recovery Framework.
Resources Needed:	May require additional resources (staff) to accomplish.

3.2 *Review and Test Disaster Response and COOP Plans Under Various Climate Scenarios*

Status:	Proposed
Lead Office(s):	ODMNS, FPM, FHEO

Support Office(s):	PIH, CPD
Hazard(s):	Extreme weather events
Vulnerabilities:	HUD and its grantees may not have adequate Disaster Response and COOP plans that anticipate risks posed under various climate scenarios.
Geographic scale:	Nationwide
Action description:	Disaster Response plans should also factor in the ability of grantees (e.g., FHIP and FHAP) to maintain continuity of services. Coordinate with tenant organizations in COOP planning, where appropriate. Ensure that office roles are clearly defined.
Major Milestones:	1) Collect Disaster Response and COOP plans. 2) Compile best practices. 3) Run regional climate scenarios/exercises. 4) Update Disaster Response and COOP plans.
Resources Needed:	May require additional resources (contract funds) to accomplish.

3.3 Work with GSA to Increase Resilience of HUD Field Offices

Status:	Proposed
Lead Office(s):	FPM, CAO
Support Office(s):	None
Hazard(s):	Extreme weather events, sea level rise
Vulnerabilities:	More than two-thirds of HUD staff members are located in Field and Regional Offices throughout the country. These offices are generally in leased space that HUD has little control over. Many of these offices may be in locations (e.g., floodplains) that are at greater risk to the effects of climate change that may disrupt HUD's ability to deliver services.
Geographic scale:	Nationwide

Action description:	Identify HUD field offices most at risk to climate-related hazards. Explore options with GSA to increase resilience of field offices (e.g., retrofit buildings, identify new lease locations).
Major Milestones:	1) Identify HUD field offices at risk from climate-related hazards. 2) Discuss options with GSA that provide immediate solutions to potential alternative work site needs and long-term solutions including building retrofits or new lease locations. 3) Ensure that alternate work sites are included in field office COOP plan.
Resources Needed:	None

3.4 Train Front-Line Employees on Disaster Response Assistance Resources and Protocols

Status:	Proposed
Lead Office(s):	FPM, ODMNS
Support Office(s):	PIH, CPD, FHEO
Hazard(s):	Extreme weather events
Vulnerabilities:	Following a disaster, residents of HUD-assisted buildings turn to HUD's field and regional offices for help in shelter and other resources. This stretches the capacity and bandwidth of field staff.
Geographic scale:	Nationwide
Action description:	Provide training on available disaster response assistance resources and civil rights training to front-line employees (including customer service representatives) in order to respond to increased calls during extreme weather events. Develop and update resource manual with critical information for recovery/response resources.
Major Milestones:	1) Provide annual training to FPM and program office customer service representatives on handling extreme weather event call traffic from a) HUD clients, b) HUD grantees, c) non-HUD clients, and d) industry groups. 2) Develop, vet across divisions, and distribute a resource manual for FPM and program office customer service representatives that provides information on handling post-disaster call traffic.

- 3) Secure resource fact sheets from FEMA, SBA, and USDA on the process for getting individual assistance from their programs. Provide fact sheets to HUD customer service staff.
- 4) Based on the content of those documents, obtain further information from other government agencies providing individual-level disaster recovery resources, e.g., Frequently Asked Questions.

Resources Needed: May require additional resources (staff) to accomplish.

3.5 Factor Future Projections of Risk into Field Office Staffing Decisions

Status: Proposed

Lead Office(s): FPM

Support Office(s): CPD, PIH

Hazard(s): Extreme weather events

Vulnerabilities: HUD's role to provide long-term leadership over the Housing Recovery Support Function of the National Disaster Recovery Framework will increasingly engage many field staff and account for a significant portion of total workload in areas frequently impacted by hurricanes and other major disasters. This will stress field capacities. HUD's capacity to run programs could be undermined by staff impacted by the disaster—helping HUD personnel recover quickly from a disaster expedites return to normal operations.

Geographic scale: Nationwide

Action description: Identify field office jurisdictions at greatest risk from extreme weather events and ensure that existing staff in these offices have the knowledge, training and guidance to efficiently and effectively implement HUD's disaster related mission. Include experience or capacity in disaster response and recovery among the factors in choosing new hires for high-risk offices. Ensure that staffing levels for field offices include consideration of disaster risks and related preparedness work.

Major Milestones:

- 1) Identify field offices at greatest risk from extreme weather events.
- 2) Identify training and staffing needs of high risk offices.

- 3) Develop short- and long-term staffing plans for high risk offices that factor increased workload from disaster preparedness and recovery work. This may include remote support from FPM staff resources at headquarters or other offices.
- 4) Develop position description elements for disaster and response that could be included in new job postings.

Resources Needed: None

3.6 Inventory Subject Matter Expertise of HUD Staff to Facilitate Effective Disaster Deployments

Status: Proposed

Lead Office(s): FPM

Support Office(s): None

Hazard(s): Extreme weather events

Vulnerabilities: Disaster response and recovery are collateral duties for most staff. HUD does have significant subject matter expertise across areas important for response and recovery. However, the approval, availability, and deployment of the most appropriate staff does not always meet the needs of impacted offices or regions.

Geographic scale: Nationwide

Action description: Develop disaster recovery roles and responsibilities that reflect the different skillsets required in disaster response and recovery initiatives. Ensure HUD personnel with the subject matter expertise to immediately leverage ongoing local and regional plans, resources, and networks are used.

Major Milestones:

- 1) Distribute disaster recovery roles and responsibilities for disaster volunteer cadres under the National Response Framework and National Disaster Recovery Framework (completed).
- 2) Regions to identify and update disaster volunteers across cadres annually (underway).
- 3) Establish national and regional strike teams to provide immediate assistance post disaster and update annually. For regions overwhelmed by a large disaster, the national strike team can be deployed to support until regional resources are identified to staff the event (underway).

4) Establish pre-approval from program and support offices for deployment of key disaster staff, including those on regional and national strike teams or National Disaster Recovery Framework cadres.

5) Establish HUD Employee Performance and Planning and Evaluation System (EPPES) elements for staff on pre-approval lists for post-disaster deployments.

Resources Needed: None

3.7 Update and Consolidate in a Single Location Disaster Response and Recovery Standard Operating Procedures and Tools

Status: Proposed

Lead Office(s): FPM, ODMNS

Support Office(s): FHEO, PIH, OCHCO

Hazard(s): Extreme weather events

Vulnerabilities: HUD does not have established disaster response standard operating procedures and tools across all programs. Disaster related roles and responsibilities across divisions are not clear. Preparedness, response, and recovery activities are undermined by this lack of clarity. Work is often duplicated and inefficient as a result of confusion. In addition, protocols may need to be strengthened to provide timely civil rights review of disaster recovery actions.

Geographic scale: Nationwide

Action description: Establish clear and concise standard operating procedures and toolkits that define roles and responsibilities for each division. Establish Service Level Agreements for implementation of standard operating procedures. Review protocols for possible gaps or deficiencies and areas for cross-program coordination. Examine whether these protocols have been documented in writing and communicated to staff and whether the appropriate staff members are points of contact.

Major Milestones: 1) Draft and execute Departmental standard operating procedures (SOP) and tool kits that define general roles and responsibilities for each division.

2) Draft and execute Service Level Agreements between divisions where more granular descriptions of tasks by role and responsibility are required, e.g., between ODMNS and FPM.

Resources Needed: May require shifting priorities and additional resources (staff) to accomplish.

4.0 Category: Conduct Research on Climate-Related Risk

4.1 *Identify Vulnerable Physical Assets and Assess Impacts*

Status:	Proposed
Lead Office(s):	PD&R
Support Office(s):	FHEO, PIH, FPM
Hazard(s):	All
Vulnerabilities:	Urban high-rises face special vulnerabilities due to flooding of building systems, high-wind event damage to structure, damage to structures and equipment from extreme temperature swings, increased infestations by pests, loss of power to elevators, and special evacuation logistics. In addition, changing needs in heating, cooling, and water use may exacerbate building systems. HUD has only a general idea of the risks and vulnerabilities of its assets at a broad spatial scale. HUD has not mapped demographic data against the locations of vulnerable HUD assets to assess disproportionate risks based on race, color, national origin, religion, sex, familial status, or disability.
Geographic scale:	Nationwide
Action description:	Map expected climate and related hazards against location of HUD-subsidized, HUD-insured, and public housing and incorporate demographic data to identify populations that are particularly at risk. Also, include asset-specific information (e.g., wood construction, critical infrastructure located below base flood elevations) to best understand vulnerability to hazards (e.g., termites). Coordinate at state-level with field office directors.
Major Milestones:	None
Resources Needed:	May require shifting priorities and additional resources (staff) to accomplish.

4.2 *Draft Research Report on Accessibility and Resilient Building Measures*

Status:	Underway
Lead Office(s):	FHEO, PD&R

Support Office(s):	None
Vulnerabilities:	The most common response to flood risks is elevation, which presents significant accessibility barriers for individuals with disabilities. The challenge is to create inclusive, integrated communities with accessible, resilient housing by providing accessible routes that are reliable over time and minimize costly service contracts for residents.
Geographic scale:	Nationwide
Action description:	Identify elements that meet accessibility standards to make elevated housing accessible. Examine innovative design alternatives to elevation as well as community planning considerations to ensure provision of an adequate supply of resilient, accessible housing in an integrated and inclusive community.
Major Milestones:	1) Conduct and report on research. 2) Collaborate with HUD components to identify solutions 3) Draft report.
Resources Needed:	May require additional resources (staff) to accomplish.

4.3 Survey Residents in HUD-Assisted Properties

Status:	Proposed
Lead Office(s):	PIH
Support Office(s):	None
Hazard(s):	All
Vulnerabilities:	Many public housing residents have special factors (e.g., communication barriers and medical needs) that make it difficult to effectively move them to safety in the event of a disaster.
Geographic scale:	Nationwide
Action description:	This will involve a contractor-led survey of residents to support PHAs in determining typical demographic profiles and any special circumstances that will affect the ability to evacuate residents and

respond to disaster. Information should be incorporated into PIC data system to allow for national planning purposes.

Major Milestones: 1) Procure contract support.
 2) Conducting of survey and evaluation of special circumstances.
 3) Develop guidance based on results.
 4) Clear and publish guidance.

Resources Needed: May require additional resources (contract funds) to accomplish.

5.0 Category: Other Actions

5.1 *Draft Equitable and Responsible Principles for Potential Climate-Related Relocation*

Status:	Proposed
Lead Office(s):	Resilience Council
Support Office(s):	PD&R, FHEO, PIH, FHA, CPD, OGC
Hazard(s):	All
Vulnerabilities:	Due to a variety of factors (most notably sea level rise) many communities will consider managed retreat from high-risk areas. In fact, several Alaska Native communities have already begun relocating due to climate-related hazards.
Geographic scale:	Nationwide
Action description:	As communities consider the use of HUD funds to relocate communities from high-risk areas to low-risk areas, HUD must establish principles to ensure that equity and other issues are considered. Through this action, HUD will develop and adopt a set of cross-agency principles. These principles will be consistent with the Department's obligation to affirmatively further fair housing.
Major Milestones:	1) Convene working group. 2) Conduct literature and legal review. 3) Develop and adopt principles.
Resources Needed:	May require additional resources (staff) to accomplish.

5.2 *Improve Energy Efficiency and Clean Energy Use in Residential Buildings*

Status:	Underway
Lead Office(s):	OER
Support Office(s):	None
Hazard(s):	Temperatures shifts and extreme weather events

Vulnerabilities:	Extreme weather events and temperature shifts – notably summer heat waves and extremely cold winters – present significant affordability challenges to the portfolio of HUD-assisted and public housing, as well as potential public health challenges to seniors and other residents. The ability of public and assisted housing operators, or residents with Housing Choice Vouchers, to afford spikes in utility bills as well as potential increases in rates will be tested during extreme weather events, as well as threaten the health and safety of residents if aging equipment unable to perform effectively during extreme heat or cold weather conditions.
Geographic scale:	Nationwide
Action description:	HUD has established an FY14-15 Annual Performance Goal (APG) of approximately 160,000 energy retrofits, new green units, or lead hazard and other healthy housing interventions. This two-year goal continues two previous cycles (FY10-11 and FY12-13) which resulted in more than 360,000 retrofits or new energy efficient units through a variety of HUD programs. HUD will implement this APG as well as several initiatives that are included in the President's Climate Action Plan, including the expansion of the Better Buildings Challenge to include multifamily buildings, a 100 MW renewable energy target for federally assisted housing; and, in partnership with USDA, improving minimum energy standards as required by the Energy Independence and Security Act of 2007, for new FHA-insured and USDA-guaranteed housing, and new construction of public and assisted housing.
Major Milestones:	<ol style="list-style-type: none">1) Reach APG energy retrofit goal.2) Help Multifamily Partners achieve 20% portfolio-wide energy reductions.3) Reach 100 MW of installed renewable energy capacity onsite at federally assisted housing, including HUD's Public Housing and Multifamily assisted portfolio.
Resources Needed:	May require additional resources (staff, program funds) to accomplish.

APPENDIX A: RISK AND VULNERABILITIES ASSESSMENT

This appendix combines Climate-Related Risk and Vulnerability Assessments from offices across HUD. These assessments were part of a rapid planning exercise conducted by HUD in order to identify preliminary risks and vulnerabilities posed by climate change. There are several actions proposed in this plan that will result in a deeper understanding and inventory of how and where climate change will impact the Department's mission, programs, and operations. This appendix is presented in the interim as the results of HUD's internal planning efforts.

The appendix is organized by four main categories of climate-related hazards: extreme weather events, temperature shifts, hydrological/precipitation changes, and sea level rise. Within each of these sections there is a discussion of the risks and vulnerabilities pertaining to the types of hazards in general, and then subset of specific hazards as well (such flooding, permafrost melt, and wildfires).

The characteristics of certain populations often increase the vulnerability and risk to a range of climate change hazards. Because these characteristics broadly apply to multiple hazards, this assessment describes these vulnerable populations susceptible to various hazards in this section rather than repeating the same list numerous times throughout the entire Risk and Vulnerability Assessment. The vulnerability of different populations to hazards and risks associated with climate change depends primarily on their exposure to particular stressors, their sensitivity to impacts, and their ability to adapt to changing conditions (From National Climate Assessment: Depietri et al. 2012; Douglas et al. 2011; Emrich and Cutter 2011).

Many of HUD's programs seek to address socioeconomic and health disparities. These disparities create uneven exposures and sensitivities to a wide variety of climate change hazards. In addition, many HUD programs aim to support the livelihoods of traditionally underserved populations, such as racial and ethnic minorities. In some cases, these populations will be disproportionately impacted by the effects of climate change. For instance, the National Climate Assessment indicates that "Socioeconomic factors that tend to increase vulnerability to such hazards include race and ethnicity (being a minority), age (the elderly and children), gender (female), socioeconomic status (low income, status, or poverty), and education (low educational attainment). The condition of human settlements (type of housing and construction, infrastructure, and access to lifelines) and the built environment are also important determinants of socioeconomic vulnerability, especially given the fact that these characteristics influence potential economic losses, injuries, and mortality" (p.377). Additionally, existing health disparities and other inequities increase vulnerability as well.

The department has a unique role in Indian Country funding a variety of services and infrastructure. According to the National Climate Assessment, "Climate change impacts on many of the 566 federally recognized tribes and other tribal and indigenous groups in the U.S. are projected to be especially severe, since these impacts are compounded by a number of persistent social and economic problems. The adaptive responses to multiple social and ecological challenges arising from

climate impacts on indigenous communities will occur against a complex backdrop of centuries-old cultures already stressed by historical events and contemporary conditions” (p.298). See Chapter 12 of the National Climate Assessment for additional information on this topic.

Extreme Weather Events

Hazard: Increased Frequency and Intensity of Severe Weather Events (General)

Consequences:

- Natural disasters may expose environmental hazards that were under control during ordinary conditions
- Mold and mildew
- Power outages
- Transportation outages
- Loss of power
- Loss of cellular service
- Combined sewer overflow
- Surface ground water pollution from run-off
- Climate change is likely to increase the occurrence of weather-related natural disasters and to disrupt patterns of occurrence in terms of geography. This not only means that communities will face a greater number of hurricanes and severe storms; it also means that communities that never faced such disasters in the past will face them in the future.

Vulnerability:

- Ginnie Mae’s key climate-related operational risks and vulnerabilities are delinquent loans due to borrowers’ inability to pay their mortgage payments as a result of a hazard (especially an extreme weather event), and the resulting impact on lenders/issuers needing to advance these funds to investors. If a hazard is catastrophic and affects many properties in issuers’ portfolios, which are the underlying collateral for Ginnie Mae mortgage-backed securities, issuers may not have enough resources and may be unable to remit these payments to investors. This situation would require Ginnie Mae to step in and fulfill its guaranty to investors, thus putting Ginnie Mae reserves and operations in jeopardy. In addition, timely and accurate monthly reporting procedures for mortgage-backed securities could be vulnerable to hazards, which would also affect payments to investors. For Presidentially declared disaster areas, Ginnie Mae has existing disaster assistance policies and procedures in place to help address these risks and vulnerabilities, and provide temporary relief to issuers.
- With only one centralized location in Washington, DC, the Ginnie Mae office and continuity of operations are also at risk from a hazard that affects the area and building where Ginnie Mae is located. A detailed COOP plan has been established to address this situation and manage a disruption of service. Other applicable climate-related risks and

vulnerabilities are more directly related to the primary market roles, policies, and procedures of FHA, VA, USDA-Rural Development, and PIH, which provide mortgage insurance and guarantees for eligible government loans. Among other requirements, mortgage loans must be federally insured or guaranteed to be eligible for inclusion in Ginnie Mae mortgage-backed securities. These government mortgage participants in the primary market are more directly involved with lending requirements, property standards, and borrower impacts. For example, FHA underwriting assesses whether properties are located in flood plains to ensure that applicable homes have flood insurance in place as a condition of providing FHA mortgage insurance. While Ginnie Mae has a more indirect role in addressing most climate-related vulnerabilities, the agency insurance and guaranty requirements inform and drive many of Ginnie Mae's program policies and procedures for the secondary mortgage market.

- In regards to extreme weather events, communities are facing a greater number of hurricanes and severe storms and these types of events are occurring where they have never occurred before. These storms can have a devastating impact on communities. The physical (infrastructure) toll can be immense and affect the water supply, power (s, transportation links and roads and bridges. This impact can disproportionately impact HUD-assisted projects/residents and the FHA portfolio.
- HUD's role to provide long-term leadership over the Housing Recovery Support Function will increasingly engage many staff and account for a significant portion of total workload in areas frequently impacted by hurricanes and other major disasters.
- Grantees might not have the capacity to run a disaster program.
- Extreme weather events can shift program priorities to quickly address needs, and require amendments to action plans (can be a timely process).
- Misunderstandings between federal partners and impacted State governments frequently arise around how available resources can be used and limitations within those resources. Lining up State priorities with what is possible within program constraints is often difficult. Addressing these misconceptions requires significant time investments from senior HUD leadership.
- Stormwater, Erosion, Mudslides, or unstable ground infrastructure may impact the construction of new homes (jeopardizing already spent funds and expenditure deadlines) or foundation of existing homes.
- Office closure due to extremity in weather could mean closing down housing counseling facilities, resource facilities, and others.
- Inadequate grantee planning for extreme weather events can hinder effective response and jeopardize lives and property. Extreme weather events can also shift program priorities to quickly address needs through short-term fixes to urgent problems, rather than focusing on larger scale coordinated solutions.

- Coalitions built through HUD-funded planning processes can be destabilized by the decreased capacity of grantees post-disaster and new influences to the processes, undermining their ability to coordinate their programs and serve vulnerable populations.
- There is no ready mechanism for information distribution that does not rely on power and/or smartphone cellular service in a post-disaster environment. Therefore, loss of power and government office closures prevent vulnerable populations from accessing much needed information on resources, leaving them open to predatory contractors and other entities who seek to profit from disaster.
- Hazard mitigation and climate adaptation planning by states and municipalities may exclude PHAs; Distribution of disaster funds under the 1937 Housing Act, Section 9k and FEMA Public Assistance Funding. PHAs do not have their own hazard mitigation or climate adaptation plans. States and entitlement communities are required to consider the needs of PHA residents in the CPD ConPlan process, but this does not often include climate hazards and many municipalities are not entitlement communities. Statutory guidelines confuse disaster funding and better cooperation with FEMA is needed. In Presidentially-declared disaster areas, Emergency Capital Funds are prohibited from being used and FEMA Public Assistance funds must be used instead, but these are often inadequate, slow to arrive, and their amount is complicated by real or potential insurance proceeds, whether or not those are realized.
- Climate change may increase the health and economic vulnerabilities of minority persons and persons with disabilities because many of these individuals live in segregated, concentrated areas of poverty and/or in substandard housing, which may be especially prone to adverse weather conditions (e.g. floods, erosion, extreme heat). Low-income minority communities, in particular, may also be more likely to be exposed to the release of hazardous materials and other pollutants into the air and water during a disaster due to the disproportionate likelihood that they are located near landfills or industrial sites or contain poorer-quality housing. Further, the communities and buildings in which minorities or persons with disabilities live – plus the individuals themselves – are more likely to have fewer resources to adapt to climate change or recover from sudden weather-related events. Such communities and individuals may disproportionately rely on federal assistance to overcome these conditions.
- HUD has not updated its Language Assistance Plan for the Department, meaning that translation and interpretation services may not be available to Limited English Proficient persons to provide them disaster-related information that HUD makes available to the general public.
- Many recipients of HUD funding have not conducted a four-factor analysis and lack a Language Assistance Plan. The result is that translation and interpretation services may not be available to limited English proficiency persons to provide them information about evacuation, emergency shelter, aid, and later, long-term housing opportunities and disaster recovery grants. The recipients likely do not even know which languages are spoken by the limited English proficiency populations in their jurisdictions. The availability of disaster funding may not be advertised in ways that are accessible to

persons with limited English proficiency. As a result, some individuals who need disaster-related assistance may not receive it, slowing recovery for the entire jurisdiction.

- As future HUD housing is planned in areas less vulnerable to extreme weather events, discrimination, NIMBYism, and exclusionary zoning practices may hinder the development of affordable housing in less vulnerable areas if housing is to be occupied by racial and ethnic minorities, families with children, or persons with disabilities, particularly mental disabilities. Certain zoning and land use laws and procedures may pose an obstacle to the rebuilding of group homes and independent living facilities that serve persons with disabilities.
- As a result of the above barriers to development, protected classes may be disproportionately displaced without safe relocation options. Even if Section 8 vouchers replace some project-based assistance, relocation to less vulnerable areas may be difficult due to discrimination against voucher holders. A significant number of vouchers may not be used, or may be used to continue to house assisted persons in more vulnerable areas.
- Climate change may cause damage to homes and community infrastructure and may lead to the rebuilding of communities in ways that contribute to or perpetuate patterns of residential segregation. Systemic hostility to housing that will serve low-income minorities may prevent the replacement/rebuilding of affordable multifamily rental housing that has been destroyed in a disaster. While certain communities may be more explicit in expressing their opposition, state and regional planning decisions may also discriminate by reflecting or tacitly approving these views. Moreover, state and regional actors may have policies and practices regarding disaster funding allocation that have a discriminatory effect.
- A formula for grants that relies on property value rather than the cost of repair may disadvantage homeowners in minority communities, where homes tend to have lower property value. Replacement and/or temporary housing may be built or provided containing physical barriers that make units inaccessible to persons with disabilities. Challenges exist in building or rehabilitating housing to withstand future weather events in a way that is accessible to persons with disabilities (e.g., housing that must be raised on platforms to withstand storm surges). Debris cleanup, restoration of electricity, and other recovery actions may be neglected in some neighborhoods by grantees. Water and air pollution due to removal and burning of debris may disproportionately burden minority communities, which are more likely to be located near landfills.

Programs at Risk:

- Section 202/811 Programs and Project-based Section 8 Rental Assistance Program provide assistance to low-income populations that include elderly and/or persons with disabilities. All FHA single-family, multifamily and health care programs that serve a wide range of income levels that also include the elderly and persons with disabilities are at risk.

- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)
- All HUD programs involved in disaster planning and all programs that make long-term plans to transition HUD housing out of areas prone to flooding, wildfires, and other extreme weather events
- HCV (Housing Choice Voucher) administration has limited ability to track and identify housing type, resident needs, and location of residents; HCV evacuation planning and natural disaster response. Outages of water, power, energy, and transportation may vary across sites during an emergency and the HCV program has limited ability to provide assistance to residents and information to first responders. The HCV program does not currently have a formalized natural disaster standard operating procedure with standardized reporting methods.
- Increased disasters, as well as congressional response to disasters, will threaten the funding for various programs. Such programs at risk include DHAP (Disaster Housing Assistance Program). DHAP funding originates with FEMA and is administered by HUD through allocations to state and local housing agencies for the benefit of individuals displaced by natural disaster (not specifically existing PHA residents).

Populations at Risk:

- Construction workers, volunteers, and program staff monitoring or administering programs that fund rehabilitation.
- Racial and ethnic minorities, including persons with limited English proficiency, families with children, and persons with disabilities may disproportionately experience hardships resulting from climate change due to existing social inequities.
- Low-income native Hawaiians who are living in Hawaii and who are eligible to reside on the Hawaiian home lands are especially susceptible because they already experience the worst housing conditions of any group in the State of Hawaii, and constitute approximately 30 percent of Hawaii's homeless population. Eighteen percent of native Hawaiians in Hawaii live in poverty, compared to 10.7 percent of all people in Hawaii. Overcrowding in low-income native Hawaiian households (in Hawaii) is a staggering 27 percent, compared to 8.5 percent for all households in Hawaii. In addition, the cost of replacing homes in Hawaii is the highest in the United States—in 2011, the median value of a home in Hawaii was \$487,400, compared to \$173,000 nationwide.
- Children are particularly vulnerable to adverse health impacts from extreme weather events. Households with children represent approximately 40 percent of low-income public housing (LIPH) households and households with children represent approximately 45 percent of Housing Choice Voucher (HCV) households. Children in HCV households present the additional vulnerability caused by the lack of information available to HUD on the location and condition of HCV units during an emergency. Children are particularly vulnerable to lack of access to public transportation, disconnect from guardians and childcare during evacuations, and the lack of heat, water, food, and air conditioning brought about by power outages. They are also vulnerable to mold growth

and poor indoor air quality, which can result after severe weather events. This vulnerability is exacerbated by the lack of information available to HUD on the location and qualities of HCV units during an emergency.

- Individuals who are elderly and/or have disabilities are particularly vulnerable to adverse health impacts from this hazard. They depend on assisted transportation and may become disconnected from caretakers, medical care, medical equipment, and medicine during emergencies. They are also vulnerable to mold growth and poor indoor air quality, which can result after severe weather events and is exacerbated by lack of mobility. Special evacuation logistics are required for this population and evacuation from high- and mid-rise buildings is especially difficult. HCV residents who are elderly and/or persons with disabilities often do not receive the same services provided by Public Housing Authorities (PHAs) to LIPH residents who are elderly and/or persons with disabilities due to the distributed nature and management structure of these housing units.
- HCV households do not receive the same services provided to LIPH households due to the distributed management of these housing units. LIPH and HCV residents with low cash flow, low social support, limited transportation, and limited English proficiency. This population depends heavily on assisted transportation, and may become disconnected from social support networks. During an evacuation, translators may be needed. HCV residents experience the additional vulnerability that HUD information on family name, composition, and location are not easily cross-referenced in existing systems.
- LIPH residents in flood zones have an increased risk to health and safety during extreme weather events.
- Residents with disabilities with assistance animals and the animals themselves are particularly vulnerable to adverse health impacts from extreme weather event hazards. They depend on assisted transportation and may become disconnected from guardians during emergencies. Special evacuation logistics are required for this population and emergency personnel may not evacuate animals or individuals may not evacuate without animals.
- Communities with low planning capacity are often provided with technical assistance from outside the region, and even when within the region, the Technical Assistance providers lack knowledge of quality local plans and networks.
- Low-income persons, who may be more likely to be minority or persons with disabilities, may lack transportation options trying to evacuate or relocate during a disaster

Operational Functions at Risk:

- Non-discrimination in HUD programs, Affirmatively Furthering Fair Housing
- Communication with field staff may be impacted when offices are closed or inaccessible.
- Readiness of staff to address these hazards and direct grantees may vary by office.
- Resources needed after the event including staffing and guidance.

- Increased workload from response efforts (task forces, cross agency efforts and customer and technical assistance) may put regular program work at risk.

Policies at Risk:

- Information gathering regarding physical assets (Physical Inspections); Insurance policies and internal PIH risk assessments. PIH needs to collect additional information on the building stock to detect vulnerabilities and plan effectively. Limited information is provided to grantees on insurance coverage requirements and HUD staff has limited capacity to evaluate the adequacy of insurance coverage.

Physical Assets at Risk:

- HUD field offices in evolving flood prone areas.
- LIPH buildings in flood zones, especially urban high-rises are vulnerable. While HUD has an overlay of PIH developments and flood zone maps and developments are inventoried for flood zone risk, the question of relocating from flood zones is very challenging. Urban high-rises face special vulnerabilities due to flooding of building systems, high-wind event damage to structure, damage to structures and equipment from extreme temperature swings, increased infestations by pests, loss of power to elevators, and special evacuation logistics. LIPH developments in Puerto Rico and the Caribbean are particularly vulnerable due to low elevations, construction type, concentration of developments, and projected sea level rise.
- Other physical assets at risk include LIPH developments in pest migration paths, urban high rises, and buildings that are poorly maintained. Urban high-rises face special vulnerabilities due to flooding of building systems, high-wind event damage to structure, damage to structures and equipment from extreme temperature swings, increased infestations by pests, loss of power to elevators, and special evacuation logistics. Existing health & safety hazards will be compounded, especially during emergencies. New hazards may arise at greater speed or with greater frequency due to additional stresses placed on buildings. This poses serious health & safety risks on an on-going and acute basis. Additionally, poorly performing LIPH developments (energy and water) are at additional risk due to funding shortages anticipated as a result of climate change impacts. Changing needs in heating, cooling, and water use may exacerbate the poor performance of the whole building or simply overtax building systems. This poses serious financial risks on an on-going and acute basis.

Hazard: Tropical Storms

The Third National Climate Assessment states that “projections further suggest that warming will cause tropical storms to be fewer in number globally, but stronger in force, with more Category 4 and 5 storms.” (p.399) Further, “the intensity, frequency, and duration of North Atlantic hurricanes, as well as the frequency of the strongest (Category 4 and 5) hurricanes, have all increased since the early 1980s. The relative contributions of human and natural causes to these

increases are still uncertain. Hurricane-associated storm intensity and rainfall rates are projected to increase as the climate continues to warm.” (p.41)

Vulnerability:

- Tropical storms can cause significant physical damage to and loss of residencies and infrastructure due to flooding, storm surge, and wind damage.
- There is a high propensity that increased storms will increase the likelihood that some people will be harmed during the post-storm recovery process through handling hazardous materials and hazardous construction practices. For example, storm debris may contain asbestos products. Asbestos was used in a variety of building products, both inside and outside the home including insulation on pipes and boilers, floor coverings, ceiling tiles and asbestos-cement siding shingles. Any resident or worker can be exposed to asbestos fibers if asbestos-containing materials are disturbed. Asbestos exposure can cause asbestosis (scarring of the lungs), lung cancer and mesothelioma. Although the potential exposure of a construction worker to asbestos may be low (due to knowledge of construction hazards) the propensity of residents or volunteers exposing themselves may be quite high. Aside from asbestos, other materials or conditions that may harm residents or volunteers include building debris or components with lead based paint, presence of mold, temporary power/combustion hazards and general construction site safety. Increased training and guidance, particularly for non-professionals, would reduce the susceptibility of these populations to harm.
- There is a high propensity for health hazards to be created on traditional building materials after a storm disaster. Mold, for example, needs the right combination of temperature, material and water to grow and paper is close to mold’s perfect growth medium. The current standard interior wall product, paper-faced gypsum board, is extremely susceptible to mold growth following floods or other water events. Mold growth, such as occurred after Hurricanes Katrina and Sandy (and after numerous other flooding events) can cause allergic reactions, and in particular exacerbate asthma. The expanded use of mold resistant building materials, such as fiberglass faced gypsum board, or weather sensitive construction practices will reduce the vulnerability of residences to extreme weather events and subsequently the susceptibility of residents to mold.
- There is a low to moderate propensity for health hazards will be created that would impact residents due to residential energy efficiency practices that do not provide for adequate ventilation. These health hazards may include increases in moisture/mold, radon levels, allergens, and combustion byproducts. According to a study by the Institute of Medicine commissioned by the EPA: “Research indicates that poor ventilation in homes, offices, and schools is associated with occupant health problems or lower productivity. However, the information base is limited, and studies in hot and humid climates are lacking. Climate change may make ventilation problems more common or more severe in the future by stimulating the implementation of energy-efficiency (weatherization) measures that limit the exchange of indoor air with outdoor air. Introduction of new materials and weatherization techniques may lead to unexpected

exposures and health risks. Energy-efficiency programs should therefore incorporate tracking mechanisms to identify problems with indoor environmental quality as they arise..." Weatherization and construction practices that account for appropriate ventilation as part of energy efficiency installation, such as mechanically balanced ventilation, can eliminate or reduce the potential for poor IAQ or other hazards. There is a moderate propensity for OLHCHH grantees to increase their ability to respond to extreme weather events. As events grow in frequency and magnitude healthy homes and lead hazard control programs will be challenged with a) achieving normal program goals in the aftermath of disasters and b) utilizing available resources to respond to disaster events.

Programs at Risk:

- The Indian Housing Block Grant program
- Loan Guarantees for Financing Tribal Housing Activities (the "Title VI" program)
- Loan Guarantees for Indian Housing (the "Section 184" program)
- The Indian Community Development Block Grant program
- The Native Hawaiian Housing Block Grant program
- Loan Guarantees for Native Hawaiians (the "Section 184A" Loan Guarantee program)
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)
- Mortgage insurance, Section 202 and 811 programs
- Public Housing

Operational Functions at Risk:

- Continuity of operations – HUD staff, HUD grantee staff, and Indian housing staff may be unable to travel to work while coping with home and family issues during a disaster.
- Provision of basic utilities and affordable, potable water and basic sanitation in HUD-assisted housing could be compromised.
- Program administration could be disrupted due to power outages or destruction of program records, property, or buildings.
- Communications between and among grantees, HUD, emergency first responders, and local governments could be impeded.
- Readiness of staff to address these hazards and direct CPD grantees may vary by office.

Hazard: Droughts

According to the National Climate Assessment, "Short-term (seasonal or shorter) droughts are expected to intensify in most U.S. regions. Longer-term droughts are expected to intensify in large areas of the Southwest, southern Great Plains, and Southeast. Annual runoff and related

river-flow are projected to decline in the Southwest and Southeast, and to increase in the Northeast, Alaska, Northwest, and upper Midwest regions, broadly mirroring projected precipitation patterns. Observational studies have shown that decadal fluctuations in average temperature (up to 1.5°F) and precipitation changes of 10% have occurred in most areas of the U.S. during the last century. Fluctuations in river-flow indicate that effects of temperature are dominated by fluctuations in precipitation. Nevertheless, as warming affects water cycle processes, the amount of runoff generated by a given amount of precipitation is generally expected to decline.” (p.75)

Vulnerability:

- Drought is an economic crisis that disproportionately affects rural populations. There are many American Indian tribes located in the American southwest, where extreme drought will be hazardous. These Indian communities will be especially vulnerable to the effects of drought because many of them are heavily dependent on agriculture and livestock for their livelihoods. Low-income and subsistence farmers will be disproportionately affected. Indian homes are more likely to be overcrowded, lack complete plumbing and require delivery of potable water. Droughts generate dust, exacerbating lung conditions such as asthma, which is more prevalent in low-income communities. Indian tribal governments and Indian communities will likely be competing with state and local jurisdictions for rights to precious local water supplies.
- Drought conditions resulting in water crisis could prevent communities from having water for harvest, daily usage, or construction projects may be slowed down. This can also lead to failure to accomplish program goals/requirements, which can mean no help for intended final program beneficiary and a finding of noncompliance for a grantee.

Programs at Risk:

- The Indian Housing Block Grant program
- Loan Guarantees for Financing Tribal Housing Activities (the “Title VI” program)
- Loan Guarantees for Indian Housing (the “Section 184” program)
- The Indian Community Development Block Grant program
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)

Operational Functions at Risk:

- Continuity of operations – HUD staff, and HUD grantee staff may experience decreases in work productivity while coping with home and family issues during a disaster.
- Provision of affordable, potable water and basic sanitation in HUD-assisted housing could be compromised.

Hazard: Floods

According to the National Climate Assessment, "There are various types of floods, some of which are projected to increase with continued climate change. Floods that are closely tied to heavy precipitation events, such as flash floods and urban floods, as well as coastal floods related to sea level rise and the resulting increase in storm surge height and inland impacts, are expected to increase. Other types of floods result from a more complex set of causes. For example, river floods are basin specific and dependent not only on precipitation but also on pre-existing soil moisture conditions, topography, and other factors, including important human-caused changes to watersheds and river courses across the United States." (p.75)

Vulnerability:

- In August 2012, the U.S. Government Accountability Office found that most tribal lands have never been mapped by FEMA for flood risk. Indian tribes' participation in the National Flood Insurance Program is extremely low, even though some Indian lands are at high risk of flooding.

Programs at Risk:

- The Indian Housing Block Grant program
- Loan Guarantees for Financing Tribal Housing Activities (the "Title VI" program)
- Loan Guarantees for Indian Housing (the "Section 184" program)
- The Indian Community Development Block Grant program
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)
- Choice Neighborhoods developments tend to be in older, industrial cities along waterfronts, particularly vulnerable to coastal flooding.

Operational Functions at Risk:

- Continuity of operations – HUD staff and HUD grantee staff may be unable to travel to work while coping with home and family issues during a disaster.
- Provision of basic utilities and affordable, potable water and basic sanitation in HUD-assisted housing could be compromised.
- Program administration could be disrupted due to power outages or destruction of program records, property, or buildings.
- Communications between and among grantees, HUD, emergency first responders, and local governments could be impeded.
- Communication with field staff may be impacted when offices are closed or inaccessible.
- Readiness of staff to address these hazards and direct grantees may vary by office.

Hazard: Wildfires

According to the National Climate Assessment, “prolonged periods of high temperatures associated with droughts contribute to conditions that lead to larger wildfires and longer fire seasons. Smoke from wildfires in one location can contribute to poor air quality in faraway regions, and evidence suggests that particulate matter can affect atmospheric properties and therefore weather patterns.” (p.9) “In some areas, prolonged periods of record high temperatures associated with droughts contribute to dry conditions that are driving wildfires.” (p.38)

Vulnerability:

- Drought, combined with extreme heat, will increase the number and severity of wildfires. Forest fires might interrupt forest harvest or recreation hampering key rural economic development drivers. Many Indian tribes are located in remote areas prone to wildfire.

Programs at Risk:

- The Indian Housing Block Grant program
- Loan Guarantees for Financing Tribal Housing Activities (the “Title VI” program)
- Loan Guarantees for Indian Housing (the “Section 184” program)
- The Indian Community Development Block Grant program
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)

Operational Functions at Risk:

- Continuity of operations – HUD staff, HUD grantee staff, and Indian housing staff may be unable to travel to work while coping with home and family issues during a disaster.
- Program administration could be disrupted due to power outages or destruction of program records, property, or buildings.
- Communications between and among grantees, HUD, emergency first responders, and local governments could be impeded.

Hazard: Winter Storms

According to the National Climate Assessment, “there is evidence of an increase in both storm frequency and intensity during the cold season since 1950, with storm tracks having shifted slightly towards the poles. Extremely heavy snowstorms increased in number during the last century in northern and eastern parts of the United States, but have been less frequent since 2000. Total seasonal snowfall has generally decreased in southern and some western areas, increased in the northern Great Plains and Great Lakes region, and not changed in other areas, such as the Sierra Nevada, although snow is melting earlier in the year and more precipitation is falling as rain versus snow. Very snowy winters have generally been decreasing in frequency in most regions over the last 10 to 20 years, although the Northeast has been seeing a normal

number of such winters. Heavier-than-normal snowfalls recently observed in the Midwest and Northeast U.S. in some years, with little snow in other years, are consistent with indications of increased blocking (a large scale pressure pattern with little or no movement) of the wintertime circulation of the Northern Hemisphere.” (p.43)

Vulnerability:

- Much of Indian Country is located in areas prone to extreme winter cold—Alaska and the northern tier of contiguous states. Further south, tribes in Oklahoma and the southern plains are experiencing more frequent and more damaging ice storms. Homes in Indian Country are more likely to be substandard, and many low-income residents struggle to pay for heating fuel. Road closures due to bad weather further isolate and endanger survivors, and hamper rescue efforts.

Programs at Risk:

- The Indian Housing Block Grant program
- Loan Guarantees for Financing Tribal Housing Activities (the “Title VI” program)
- Loan Guarantees for Indian Housing (the “Section 184” program)
- The Indian Community Development Block Grant program
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)

Operational Functions at Risk:

- Continuity of operations – HUD staff and grantees’ housing staff may be unable to travel to work while coping with home and family issues during a disaster.
- Program administration could be disrupted due to destruction of infrastructure. For example, if telephone or broadband access is interrupted, grantees might not be able to access program funds. Road closures could delay assistance to isolated survivors.
- Communications between and among grantees, HUD, emergency first responders, and local governments could be impeded.
- Readiness of staff to address these hazards and direct grantees may vary by office.

Hazard: Tornadoes

According to the National Climate Assessment, “Recent research has yielded insights into the connections between global warming and the factors that cause tornadoes and severe thunderstorms (such as atmospheric instability and increases in wind speed with altitude). Although these relationships are still being explored, a recent study suggests a projected increase in the frequency of conditions favorable for severe thunderstorms.” (p. 43)

Vulnerability:

- Much of Indian Country is located in areas prone to severe thunderstorms and tornadoes. The Southern Plains Office of Native American Programs serves 47 American Indian tribes in the states of Oklahoma, Texas, Kansas, Louisiana, and Missouri. Many low-

income Indians in these areas live in mobile homes that offer little protection from high winds.

Programs at Risk:

- The Indian Housing Block Grant program
- Loan Guarantees for Financing Tribal Housing Activities (the "Title VI" program)
- Loan Guarantees for Indian Housing (the "Section 184" program)
- The Indian Community Development Block Grant program
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)

Operational Functions at Risk:

- Continuity of operations – HUD staff, HUD grantee staff, and Indian housing staff may be unable to travel to work while coping with home and family issues during a disaster.
- Program administration could be disrupted due to destruction of infrastructure. For example, if telephone or broadband access is interrupted, grantees might not be able to access program funds. Road closures could delay assistance to isolated survivors.
- Communications between and among grantees, HUD, emergency first responders, and local governments could be impeded.
- Communication with field staff may be impacted when offices are closed or inaccessible.
- Readiness of staff to address these hazards and direct CPD grantees may vary by office.

Temperature Shifts

According to the National Climate Assessment, "U.S. average temperature has increased by 1.3°F to 1.9°F since record keeping began in 1895; most of this increase has occurred since about 1970. The most recent decade was the nation's warmest on record. Temperatures in the United States are expected to continue to rise. Because human-induced warming is superimposed on a naturally varying climate, the temperature rise has not been, and will not be, uniform or smooth across the country or over time." (p.28)

Hazard: Temperature Shifts (General)**Vulnerability:**

- Increases in heating and cooling costs may impact use of future funding. Energy retrofits may make housing rehabilitation cost prohibitive or Participating Jurisdictions could run up against HOME maximum subsidy limits.
- Shorter construction seasons resulting from longer winters can impact grantees' ability to meet expenditure deadlines.
- Could result in fewer activities as increased construction costs are associated with temperature mitigating design strategies.

- Increased use of cooling centers during heat waves and warming facilities during cold snaps may cause a need for grantees to shift funding priorities.

Populations at Risk:

- Native populations who rely on subsistence fishing and agriculture will be affected by changes in availability of land and fish and wildlife migration.
- Residents with disabilities with assistance animals and the animals themselves are particularly vulnerable to adverse health impacts from this hazard. They depend on assisted transportation and may become disconnected from guardians during emergencies. Special evacuation logistics are required for this population and emergency personnel may not evacuate animals or individuals may not evacuate without animals.
- Extreme heat contributes to higher ground-level ozone concentrations, which poses serious risks to asthmatic individuals.

Operational Functions at Risk:

- Communication with field staff may be impacted when offices are closed or inaccessible.
- Readiness of staff to address these hazards and direct grantees may vary by office.

Policies at Risk:

- Climate change may impact building codes related to efficiency (enforced at the local level with HUD established minimums); heating and air conditioning policy; and information gathering regarding physical assets (EPIC, GPNA, energy audits). Beyond minimum codes, building codes are set by local jurisdictions and states and largely outside of HUD's control, but there is potential for HUD to set higher standards for Public Housing grantees. PIH may need to reconsider ban on air conditioning subsidies, potentially causing funding shortfalls, without which residents are at risk of heat-related health impacts or financial distress due to elevated energy costs. PIH needs to collect additional information on the building stock to detect vulnerabilities and plan effectively.

Physical Assets at Risk:

- LIPIH that are poorly performing (energy and water) will have to deal with changing needs in heating, cooling, and water use that may exacerbate the poor performance of the whole building or simply overtax building systems. This poses serious financial, health & safety risks on an on-going and acute basis. Specifically, LIPIH developments in the far North, far South, and other locations with extreme temperatures; LIPIH developments in inner cities and urban high rises; scattered sites and mixed age and construction type developments; poorly performing developments (energy and water) are at risk. Buildings may suffer superficial or structural damage due to heat and cold stress outside their engineered tolerances. Heat island effects exacerbate heat damage risks in urban areas. Urban high-rises face special vulnerabilities due to flooding of building systems, high-wind event damage to structure, damage to structures and equipment from extreme temperature swings, increased infestations by pests, loss of power to elevators, and special evacuation logistics. Scattered site developments face special vulnerabilities for logistical reasons related to managing a varied building stock

(construction type, building systems, building materials, building age, etc.) in varied locations in the face of new threats. Changing needs in heating, cooling, and water use may exacerbate the poor performance of the whole building or simply overtax building systems. This poses serious health & safety risks on an on-going and acute basis.

Hazard: Extreme Heat

According to the National Climate Assessment, "as expected in a warming climate, recent trends show that extreme heat is becoming more common, while extreme cold is becoming less common. Evidence indicates that the human influence on climate has already roughly doubled the probability of extreme heat events such as the record-breaking summer heat experienced in 2011 in Texas and Oklahoma. The incidence of record-breaking high temperatures is projected to rise." (p.9)

Vulnerability:

- American Indians tend to suffer disproportionately from illness and diseases that are exacerbated by extreme heat. Most HUD-assisted homes in Indian Country do not have air-conditioning. Extreme, prolonged heat may force the eventual relocation of a number of American Indian communities, mostly located in the American southwest. Most tribes could not afford to quickly relocate and would depend heavily on non-tribal resources to assist. Relocation, for most tribes, would be a cultural disaster, depriving many families of their support network and exacerbating an array of social ills.
- Low-income native Hawaiians who are living in Hawaii and who are eligible to reside on the Hawaiian home lands are further susceptible because they already experience the worst housing conditions of any group in the State of Hawaii, and constitute approximately 30 percent of Hawaii's homeless population. Eighteen percent of native Hawaiians in Hawaii live in poverty, compared to 10.7 percent of all people in Hawaii. Overcrowding in low-income native Hawaiian households (in Hawaii) is a staggering 27 percent, compared to 8.5 percent for all households in Hawaii.
- The Office of Housing's programs are vulnerable to the effects of extreme heat events and especially those that serve low-income families and functional needs populations, such as the elderly and persons with disabilities. A large majority of FHA projects/homes are in urban areas and are generally more susceptible to extreme heat events because of the heat island effect. These projects/homes tend to experience power outages due to the high energy demands on the grid and cause heat-related as well as other illnesses due to residents due to the lack of power. In addition, as the demand for energy increases, a project/home owner will also experience increased utility costs. For the HUD-assisted multifamily portfolio, owners especially the non-profit owners may face environmental and affordability challenges and residents may also face affordability challenges if they pay for their own utilities.

Programs at Risk:

- The Indian Housing Block Grant program

- Loan Guarantees for Financing Tribal Housing Activities (the "Title VI" program)
- Loan Guarantees for Indian Housing (the "Section 184" program)
- The Indian Community Development Block Grant program
- The Native Hawaiian Housing Block Grant program
- Loan Guarantees for Native Hawaiians (the "Section 184A" Loan Guarantee program)
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)

Operational Functions at Risk:

- Continuity of operations – HUD staff may be unable to travel to work while coping with home and family issues during a disaster.
- Provision of affordable, potable water and basic sanitation in HUD-assisted housing could be compromised.
- Program administration could be disrupted due to power outages, which can result when there is excessive demand for air-conditioning.
- Communication with field staff may be impacted when offices are closed or inaccessible.
- Readiness of staff to address these hazards and direct grantees may vary by office.

Hazard: Permafrost Melt

According to the National Climate Assessment, "Alaska Native communities are increasingly exposed to health and livelihood hazards from increasing temperatures and thawing permafrost, which are damaging critical infrastructure, adding to other stressors on traditional lifestyles. The increased thawing of permafrost (permanently frozen soil) along the coasts and rivers is an especially potent threat to Alaska Native villages because it causes serious erosion, flooding, and destruction of homes, buildings, and roads from differential settlement, slumping, and/or collapse of underlying base sediments). This loss of infrastructure is further exacerbated by loss of land-fast sea ice, sea level rise, and severe storms." (p.306)

Vulnerability:

- Almost all of the rural housing in Alaska that is subsidized with Indian Housing Block Grant funds is built on permafrost. As the permafrost melts, the houses built on pilings foundations become unstable and sink. Neighborhoods become unnavigable as the permafrost turns to deep mud; residents lose their ability to travel, and become more isolated from one another. The land thaws and refreezes, damaging roads, buildings, airport runways, and home foundations. According to the Environmental Protection Agency, Alaska's northwestern coastal erosion is causing some shorelines to retreat at rates averaging tens of feet per year. Melting sea ice has reduced natural coastal protection. In several Alaska Native villages, erosion has caused homes to collapse into

the sea. Severe erosion has forced some Alaska Native Villages' populations to relocate in order to protect lives and property.

- The Alaska Native population that is served by HUD's housing programs is mostly rural and low-income. Alaska Natives tend to endure more poverty, have less education, and suffer more from disabilities and chronic illnesses than other groups in Alaska. Because of a lack of affordable housing, Alaska Natives are much more likely to live in overcrowded conditions. In addition, they historically have had limited access to credit and financial services, although this has improved recently in some areas. In many cases, Alaska Natives' strong historical and cultural ties to their home lands complicate attempts to relocate villagers. These factors make Alaska Natives living in traditional areas more vulnerable to the threat of sea rise and coastal erosion.

Programs at Risk:

- The Indian Housing Block Grant program
- Loan Guarantees for Financing Tribal Housing Activities (the "Title VI" program)
- Loan Guarantees for Indian Housing (the "Section 184" program)
- The Indian Community Development Block Grant program
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)

Populations at Risk:

- Residents of low-income Alaska Native housing, and the Alaska Native tribes or their designated entities that may compete for, or that administer, HUD funds. Also at risk are Alaska Native tribes, tribally designated housing entities, and Alaska Native individuals who receive or apply for HUD-guaranteed loans.
- Areas vulnerable to sea level rise may face an increased need for disaster recovery investments.
- Communities close to sea level may not evaluate projects funded with CPD programs for their long-term vulnerability to this risk.

Operational Functions at Risk:

- Continuity of operations – HUD staff, local housing staff, and other service providers may be unable to travel to work while coping with home and family issues.

Hydrological/ Precipitation Changes

According to the National Climate Assessment, "Average U.S. precipitation has increased since 1900, but some areas have had increases greater than the national average, and some areas have had decreases. More winter and spring precipitation is projected for the northern United States, and less for the Southwest, over this century." (p.32)

Hazard: Changes in Precipitation (General)**Vulnerability:**

- The Office of Housing's programs are vulnerable to the effects of changing precipitation and the impacts of flooding and drought. The increase in flooding events results in a higher risk to experience physical damage to projects/homes and causes increases in flood and other types of insurance that may become unaffordable.
- Flooding or droughts can impact grantee project priorities, and require amendments to action plans (can be a time consuming process)
- Flooding and wildfires might disrupt or destroy a project that is under construction. Increasing project costs, jeopardizing already spent funds and expenditure deadlines.
- Water costs might increase during periods of drought and can impact the use of funds.
- Forest fires might interrupt forest harvest or recreation hampering key rural economic development drivers.
- Drought conditions resulting in water crisis could prevent communities from having water for harvest, daily usage, or construction projects may be slowed down.
- Changes in traditional water patterns could render prior investments worthless by forcing relocations away from infrastructure.
- Stormwater runoff could pose a threat to aquaculture-dependent communities since their main source of income is from fishing or shellfish harvesting/ farming.

Programs at Risk:

- Choice Neighborhoods developments tend to be in older, industrial cities along waterfronts, particularly vulnerable to combined sewer overflows.
- Office of Housing programs.
- Office of Public and Indian Housing programs

Populations at Risk:

- Children, the elderly, and persons with disabilities residing in HCV and LIPH households are particularly vulnerable to polluted water sources during extreme precipitation events due to their limited mobility.

Operational Functions at Risk:

- Communication with field staff may be impacted when offices are closed or inaccessible.
- Readiness of staff to address these hazards and direct grantees may vary by office.

Policies at Risk:

- Building codes related to durability (for example, snow loads and drainage); and information gathering regarding physical assets (Physical Inspections, GPNA) are at risk. Beyond minimum codes, building codes are set by local jurisdictions and states and largely outside of HUD's control, but there is potential for HUD to set higher standards

for Public Housing grantees. PIH needs to collect additional information on the building stock to detect vulnerabilities and plan effectively.

Physical Assets at Risk:

- HUD field offices and LIPH in evolving flood prone areas.
- LIPH developments on riverbanks, flood plains, hill sides, steep valleys, in wildfire prone areas, in heavy snowfall areas, and remote rural areas; and LIPH developments in inner cities and urban high rises; scattered sites and mixed age and construction type developments are all at risk. In addition to the risks posed by precipitation and drought to LIPH buildings, HUD has only a general idea of the risks and vulnerabilities at a fine spatial scale. Rural buildings pose additional risks for the lack of access to alternate sources of water or shelter for evacuations. Urban developments are prone to flooding and combined sewer overflow risks due to extensive impervious surface and high density. Scattered site developments face special vulnerabilities for logistical reasons related to managing a varied building stock (construction type, building systems, building materials, building age, etc.) in varied locations in the face of new threats.

Sea Level Rise

According to the National Climate Assessment, "Global sea level has risen by about 8 inches since reliable record keeping began in 1880. It is projected to rise another 1 to 4 feet by 2100. The oceans are absorbing over 90% of the increased atmospheric heat associated with emissions from human activity.¹¹⁰ Like mercury in a thermometer, water expands as it warms up (this is referred to as "thermal expansion") causing sea levels to rise. Melting of glaciers and ice sheets is also contributing to sea level rise at increasing rates. Since the late 1800s, tide gauges throughout the world have shown that global sea level has risen by about 8 inches. A new data set shows that this recent rise is much greater than at any time in at least the past 2000 years. Since 1992, the rate of global sea level rise measured by satellites has been roughly twice the rate observed over the last century, providing evidence of additional acceleration." (p. 44)

Hazard: Sea Level Rise (General)

Vulnerability:

- Sea level rise may lead to migration or relocation of communities. As the National Climate Assessment explains, "Climate change related impacts are forcing relocation of tribal and indigenous communities, especially in coastal locations. These relocations, and the lack of governance mechanisms or funding to support them, are causing loss of community and culture, health impacts, and economic decline, further exacerbating tribal impoverishment." (p. 298)
- Sea level rise will affect physical assets and programs across the broad range of HUD programs.
- Low-income native Hawaiians who are living in Hawaii and who are eligible to reside on the Hawaiian home lands are also susceptible to tsunamis and the negative effects of sea

rise. Native Hawaiians already experience the worst housing conditions of any group in the State of Hawaii, and constitute approximately 30 percent of Hawaii's homeless population. Eighteen percent of native Hawaiians in Hawaii live in poverty, compared to 10.7 percent of all people in Hawaii. Overcrowding in low-income native Hawaiian households (in Hawaii) is a staggering 27 percent, compared to 8.5 percent for all households in Hawaii. In addition, the cost of replacing homes in Hawaii is the highest in the United States—in 2011, the median value of a home in Hawaii was \$487,400, compared to \$173,000 nationwide.

- HUD provides financing to construct/rebuild projects/homes in at-risk communities, so we must build structures that can withstand sea level rise to negate endangering the residents/homeowners.
- Areas vulnerable to sea level rise may face an increased need for disaster recovery investments.
- Communities close to sea level may not evaluate projects funded with CPD programs for their long-term vulnerability to this risk.
- Hazard mitigation and climate adaptation planning by states and municipalities may exclude PHAs, and distribution of disaster funds under the 1937 Housing Act, Section 9k and FEMA Public Assistance Funding may be impacted by climate change. PHAs do not have their own hazard mitigation or climate adaptation plans. States and entitlement communities are required to consider the needs of PHA residents in the CPD ConPlan process, but this does not often include climate hazards and many municipalities are not entitlement communities. Statutory guidelines confuse disaster funding and better cooperation with FEMA is needed. In Presidentially-declared disaster areas, Emergency Capital Funds are prohibited from being used and FEMA Public Assistance funds must be used instead, but these are often inadequate, slow to arrive, and their amount is complicated by real or potential insurance proceeds, whether or not those are realized.

Programs at Risk:

- The Indian Housing Block Grant program
- Loan Guarantees for Financing Tribal Housing Activities (the "Title VI" program)
- Loan Guarantees for Indian Housing (the "Section 184" program)
- The Indian Community Development Block Grant program
- The Native Hawaiian Housing Block Grant program
- Loan Guarantees for Native Hawaiians (the "Section 184A" Loan Guarantee program)
- Office of Community Planning and Development programs (CDBG, HOME, ESG, HOPWA, CoC)
- Choice Neighborhoods developments are at risk because they tend to be in older, industrial cities along waterfronts, particularly vulnerable to coastal flooding.

Populations at Risk:

- HCV residents in flood zones, not currently well tracked at a detailed level by HUD, will face increasing risk of coastal flooding.
- LIPH residents in flood zones have an increased risk to health and safety.

Operational Functions at Risk:

- Continuity of operations – HUD staff and housing staff may be unable to travel to work while coping with home and family issues during a disaster.
- In the case of tsunamis, program administration could be disrupted due to power outages, and communications between and among grantees, HUD, emergency first responders, and local governments could be impeded.
- Communication with field staff may be impacted when offices are closed or inaccessible.
- Readiness of staff to address these hazards and direct grantees may vary by office.

Policies at Risk:

- Information gathering regarding physical assets (Physical Inspections); Insurance policies and internal PIH risk assessments.
- PIH needs to collect additional information on the building stock to detect vulnerabilities and plan effectively. Limited information is provided to grantees on insurance coverage requirements and HUD staff has limited capacity to evaluate the adequacy of insurance coverage.

Physical Assets at Risk:

- LIPH buildings in flood zones, especially urban high-rises are vulnerable. While HUD has an overlay of PIH developments and flood zone maps and developments are inventoried for flood zone risk, the question of relocating from flood zones is very challenging. Urban high-rises face special vulnerabilities due to flooding of building systems, high-wind event damage to structure, damage to structures and equipment from extreme temperature swings, increased infestations by pests, loss of power to elevators, and special evacuation logistics.
- Additionally, LIPH developments in Puerto Rico and the Caribbean are particularly vulnerable due to low elevations, construction type, concentration of developments, and projected sea level rise.

APPENDIX B: RESILIENCE COUNCIL MEMBERS AND STAFF

Resilience Council Members

Harriet Tregoning (Chair)

Director, Office of Economic Resilience

Carol Galante

*Federal Housing Administration Commissioner
and Assistant Secretary for Housing*

Sandra Henriquez

*Assistant Secretary for Public and Indian
Housing*

Ted Tozer

President, Ginnie Mae

Gustavo Velasquez

*Assistance Secretary for Fair Housing and Equal
Opportunity*

Kathy O'Regan

*Assistant Secretary for Policy Development and
Research*

Mary McBride

*Assistant Deputy Secretary for Field Policy and
Management*

Michael Anderson

Chief Human Capital Officer

Melanie Roussell

Assistant Secretary for Public Affairs at HUD

Cliff Taffet

*Acting Assistant Secretary for Community
Planning and Development*

Damon Smith

Acting General Counsel

Matt Ammon

*Acting Director for the Office of Healthy Homes
and Lead Hazard Control*

Mark Carr

*Director, Office of Disaster Management and
National Security*

Josh Sawislak

Senior Advisor to the Secretary

Marion McFadden

Senior Advisor to the Secretary

Henk Ovink

Senior Advisor to the Secretary

Scott Davis

Senior Advisor to the Secretary

Resilience Council Designees and Staff

Office of Community Planning and Development

Kevin Bush
Sunaree Marshall
Katherine Buckingham
Meg Barclay
Lauren McNamara

Federal Housing Administration

Janet Golrick

Office of Fair Housing and Equal Opportunity

Catherine Yoon

Office of Field Policy and Management

Rick Garcia
Holly Leicht
Jennifer Cribbs

Ginnie Mae

Sabra Loewus
Kathy Gibbons

Office of the Chief Human Capital Officer

Jacob Weisman

Office of General Counsel

Carey Whitehead

Office of Healthy Homes and Lead Hazard Control

Marty Nee

Office of Policy Development and Research

Ben Winter
Justin Scheid

Office of Public and Indian Housing

Nora McArdle
Ted Key
Emily Wright
Julia Hustwit
Thomas Chase

APPENDIX C: LIST OF ACRONYMS

AFFH	Affirmatively Furthering Fair Housing
CAO	HUD Office of the Chief Administrative Officer
CDBG	HUD Community Development Block Grant
CEQ	White House Council on Environmental Quality
CFR	Code of Federal Regulations
CIR	HUD Office of Congressional and Intergovernmental Relations
CoC	HUD Continuum of Care Program
COOP	Continuity of Operations
CPD	HUD Office of Community Planning and Development
DHAP	Disaster Housing Assistance Program
EO	Executive Order
EPA	US Environmental Protection Agency
ESG	Emergency Solutions Grants Program
FEMA	Federal Emergency Management Agency
FHA	HUD Federal Housing Administration
FHAP	Fair Housing Assistance Program
FHEO	HUD Office of Fair Housing and Equal Opportunity
FHIP	Fair Housing Initiatives Program
FPM	HUD Office of Field Policy and Management
Ginnie Mae	Government National Mortgage Association
GSA	US General Services Administration
HCV	Housing Choice Voucher
HEROS	HUD Environmental Review Online System
HOME	Home Investment Partnerships Program
HOPWA	Housing Opportunities for Persons with AIDS Program
HUD	US Department of Housing and Urban Development
ICDBG	Indian Community Development Block Grant Program
LIPH	Low-Income Public Housing
MAP	Multifamily Accelerated Processing
NCA	National Climate Assessment
OCHCO	HUD Office of the Chief Human Capital Officer
ODMNS	HUD Office of Disaster Management and National Security
OGC	HUD Office of General Counsel
OEE	HUD Office of Environment and Energy
OER	HUD Office of Economic Resilience
OLHCHH	HUD Office of Lead Hazard Control and Healthy Homes
ONAP	HUD Office of Native American Programs
PD&R	HUD Office of Policy Development and Research
PHA	Public Housing Authority
PIH	HUD Office of Public and Indian Housing
SBA	US Small Business Administration
USDA	US Department of Agriculture
VA	US Department of Veterans Affairs